SC-21

21st Century Surface Combatants

-

INDUSTRY DAY

27 Sept 1996

EMAIL: Mahoney_Dennis_CAPT@hq.navsea.navy.mil

Phone: 703-602-6453 FAX: 703-602-6480

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

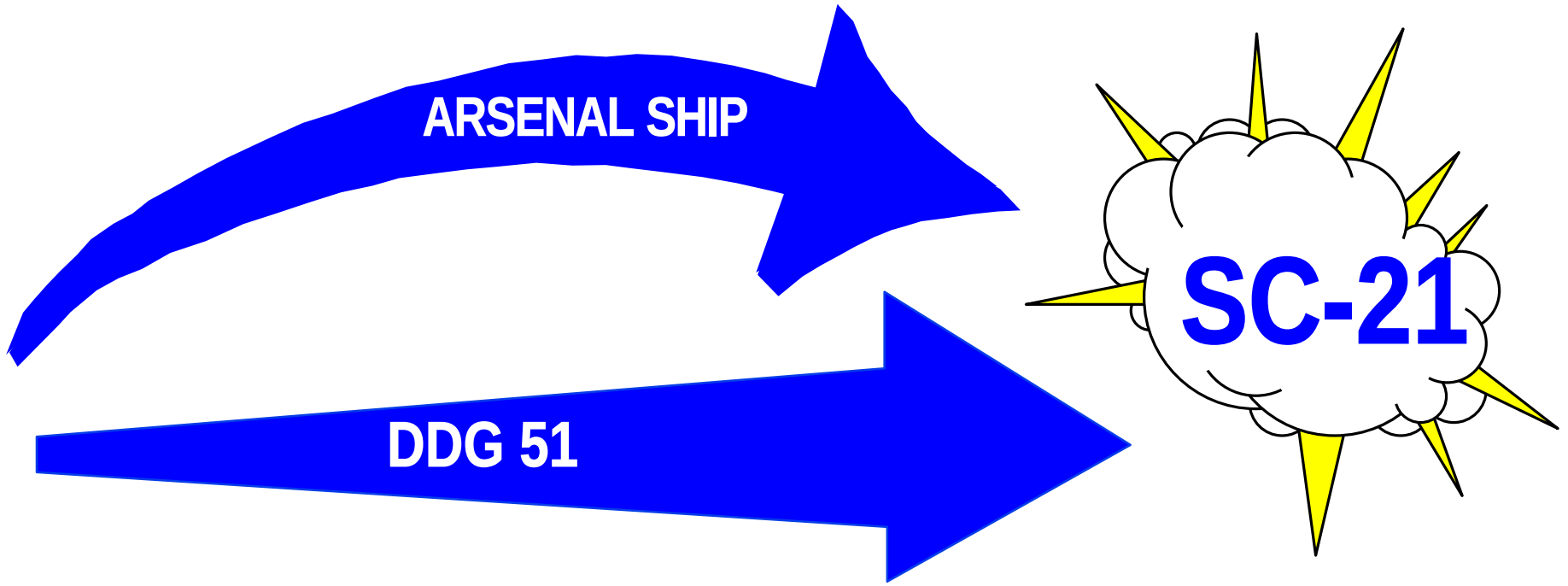
Why Are We Here ?

- Provide SC-21 Program Overview
- Communicate Program
  - CHALLENGES
  - REQUIREMENTS
  - GOALS
- Discuss Industry Role
- Open Channels for Future Communications
  - SC-21 PRODUCT MODEL
  - WORKSHOPS
  - INTERNET
  - IPT PARTICIPATION
- Opportunity to Express Concerns / Issues

AGENDA

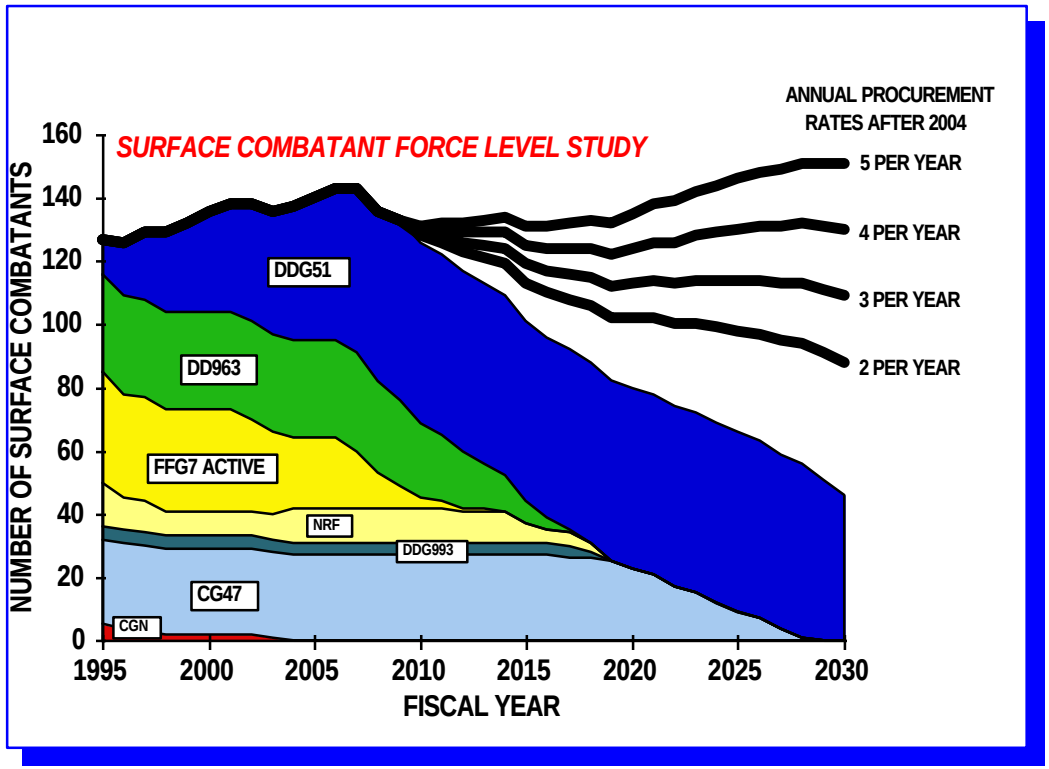
0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

SC-21
INDUSTRY DAY



SURFACE COMBATANT FORCE STRUCTURE

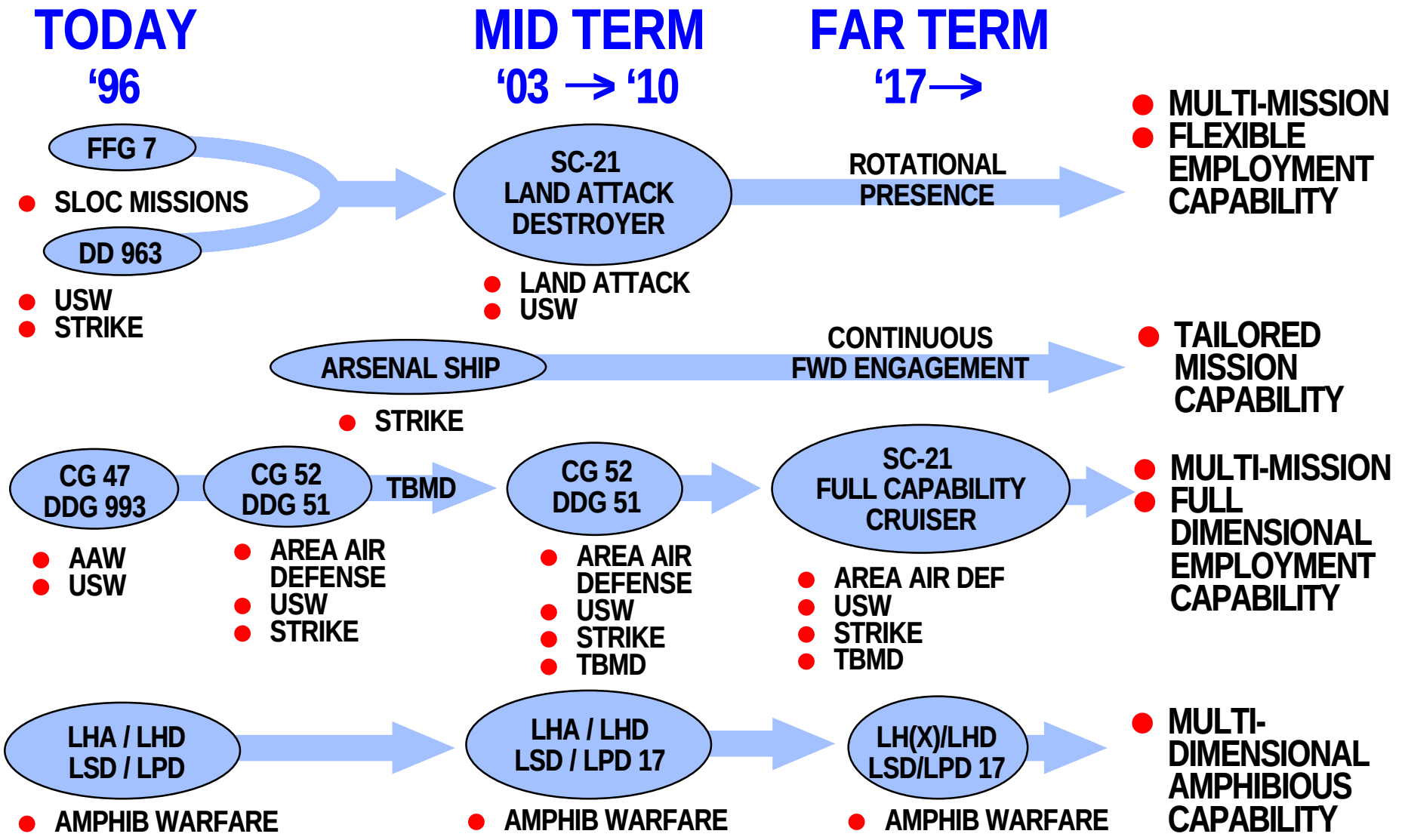
INVENTORY



REQUIREMENTS

- SCFLS : 135-165 FOR 2 MRC SCENARIO
  - INCREASED DEMAND FOR DIRECT SURFACE COMBATANT CONTRIBUTION TO GROUND CAMPAIGN
  - EMPHASIS ON MULTI-MISSION CAPABILITY
- FORCE ARCHITECTURE ASSESSMENT: 157
- N3/5 PRESENCE STUDY: 120-135
- BOTTOM UP REVIEW: 110-116
- CURRENT OPS: AVG 121
- TODAY'S INVENTORY: 115
  (PLUS 10 NRF FFG'S)

THE REQUIREMENT



SC-21 MISSION

- INDEPENDENT FORWARD PRESENCE . . . JOINT AND COMBINED OPERATIONS
- CARRY WAR TO THE ENEMY OFFENSIVELY
  - SUPERSONIC PRECISION STRIKE TO 1,000 NM
  - BATTLEFIELD INTERDICTION TO 250 NM
  - CLOSE FIRE SUPPORT TO 100 NM
- ESTABLISH MARITIME DOMINANCE
- GOAL: 30% MANNING OF DDG-51
  30% LIFE CYCLE COST OF DDG-51

YIELD SAVINGS OF UP TO $20M PER YEAR PER SHIP

MULTI-MISSION . . . EMPHASIS -- LAND ATTACK

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

SC-21 CHALLENGES

- Understanding Requirements
- Capability / Affordability Tradeoff
- Total Ship Systems Engineering
- Technology Transition
- Industry Involvement
- Modeling & Simulation
- Acquisition Streamlining
- Resources

MISSION NEEDS STATEMENT

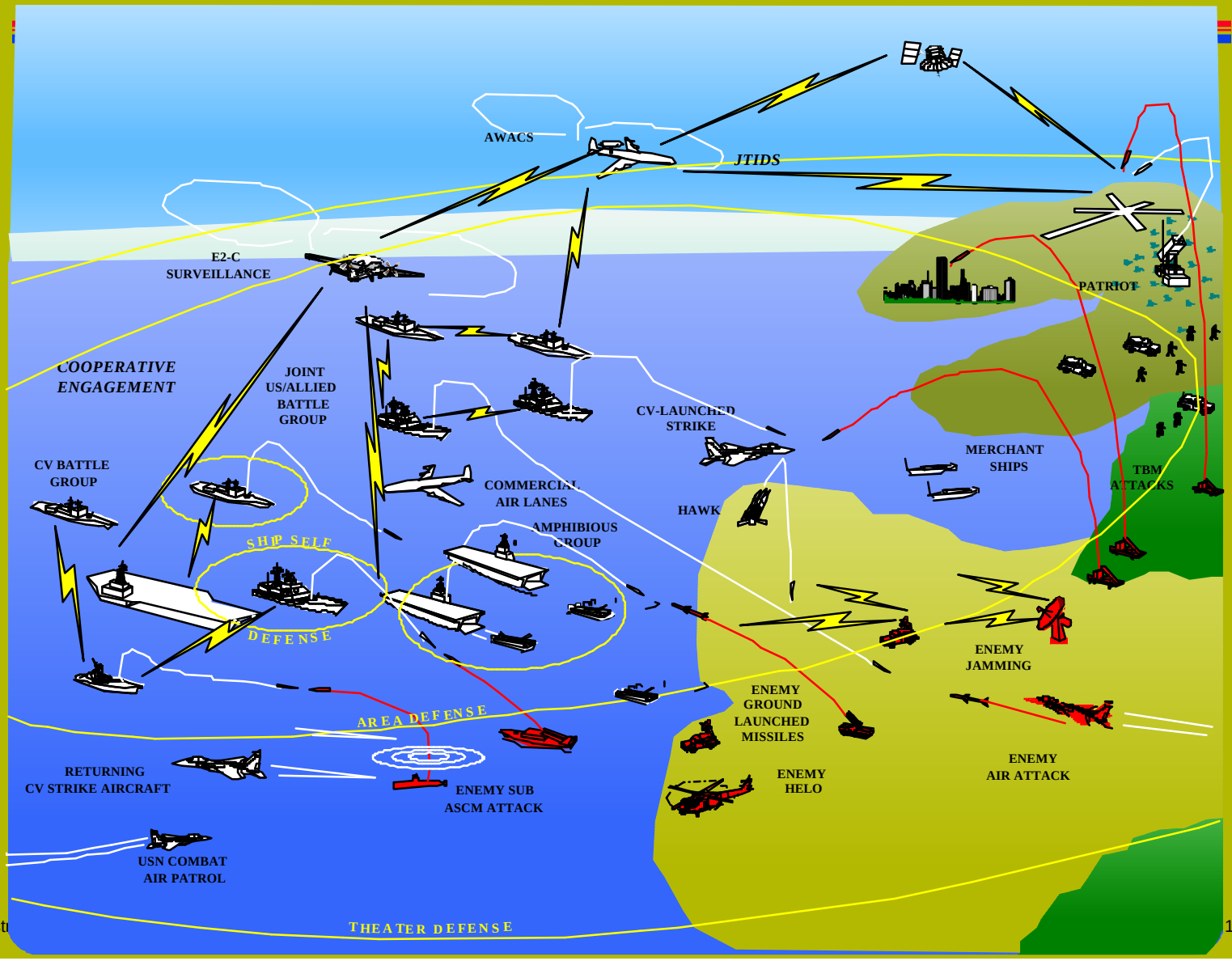
- Power Projection
- Battlespace Dominance
- Command, Control, & Surveillance
- Survivability
- Mobility
- Fleet Support Operations
- Non-Combat Operations

COMPREHENSIVE JOINT REQUIREMENTS

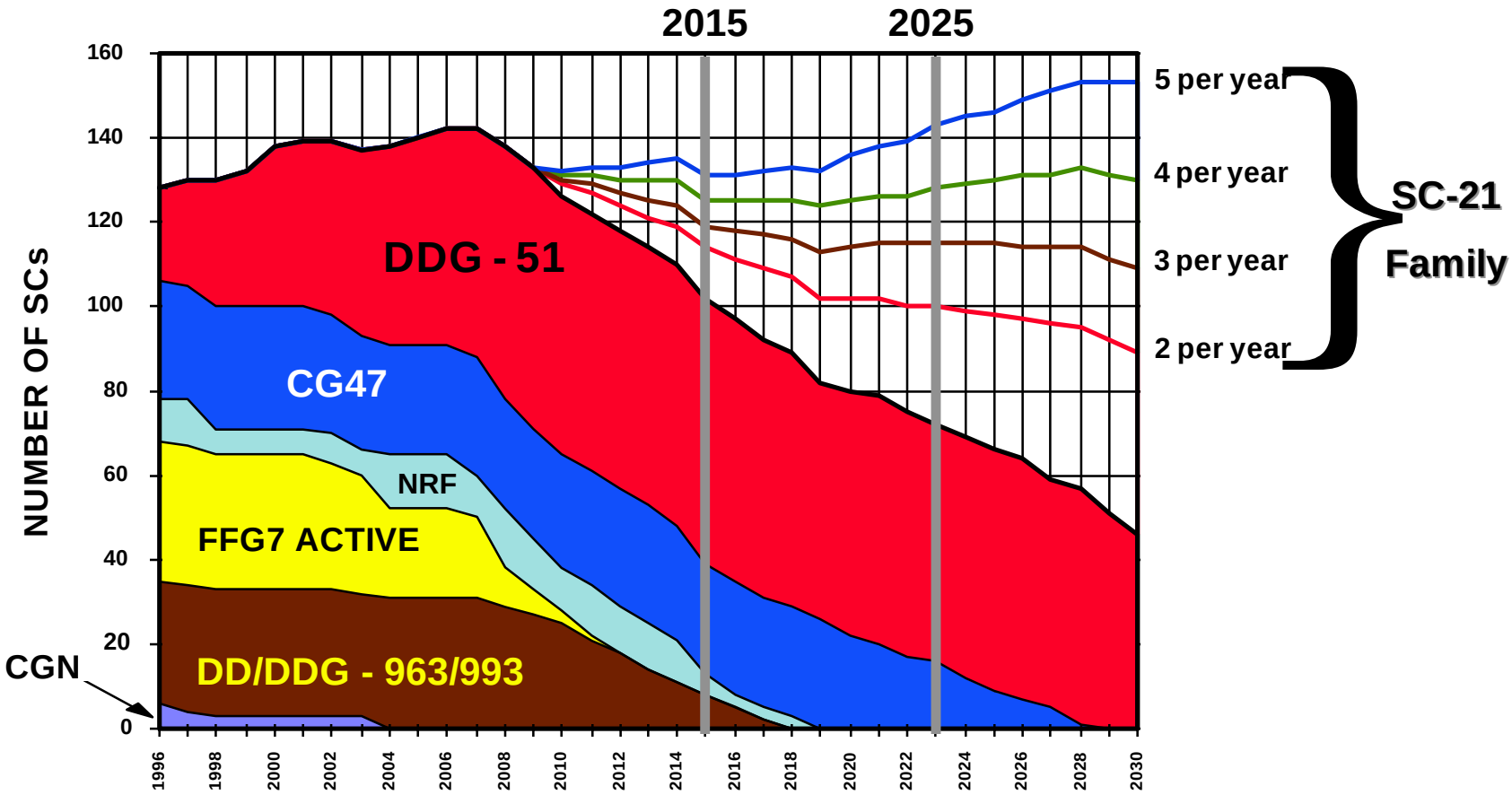
MNS DIRECTED ACTIONS

- "..capitalize on ***advanced technology***"
- " ..***passive defensive capability***,
  - including stealth design or radar cross section reduction, signal intercept exploitation, and acoustic signature reduction."
- "..***minimize manning requirements*** to reduce the number of personnel placed at risk,"
- "..***optimizes life cycle cost and performance***"
- "minimizes operating conflicts; ***permit rapid upgrade and change*** in response to evolving operational"
- "..keep ***technological pace with commercial capabilities***."
- "***Emerging technologies must be accounted for during the developmental phase***.."
- "The ***ship must be automated*** .. to realize ***significant manpower reductions*** in engineering, combat systems, ship support and Condition III watchstanding requirements."

LITTORAL ENVIRONMENT

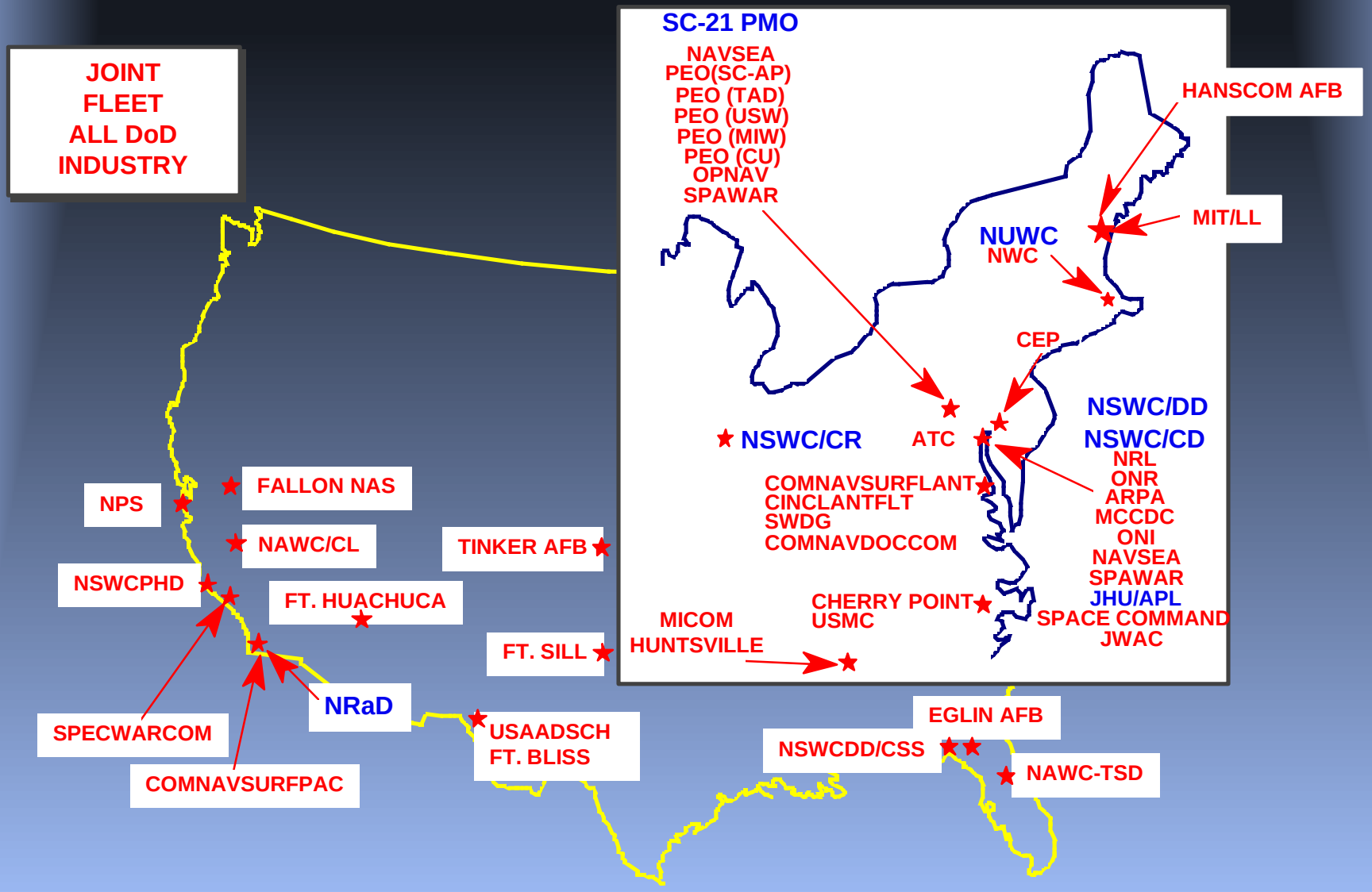


SURFACE COMBATANT INVENTORY

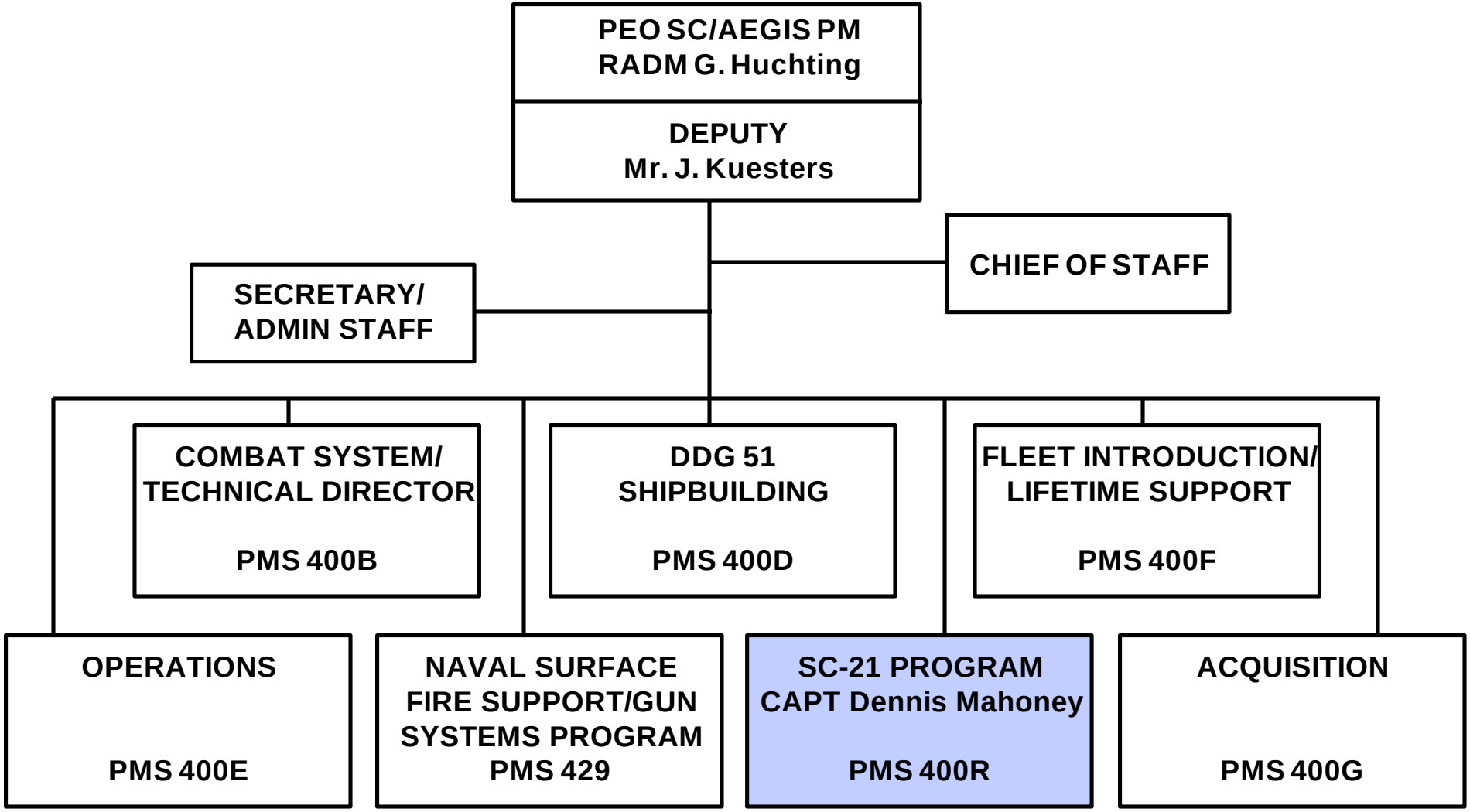


Capability/Affordability/Force Level - Tradeoff

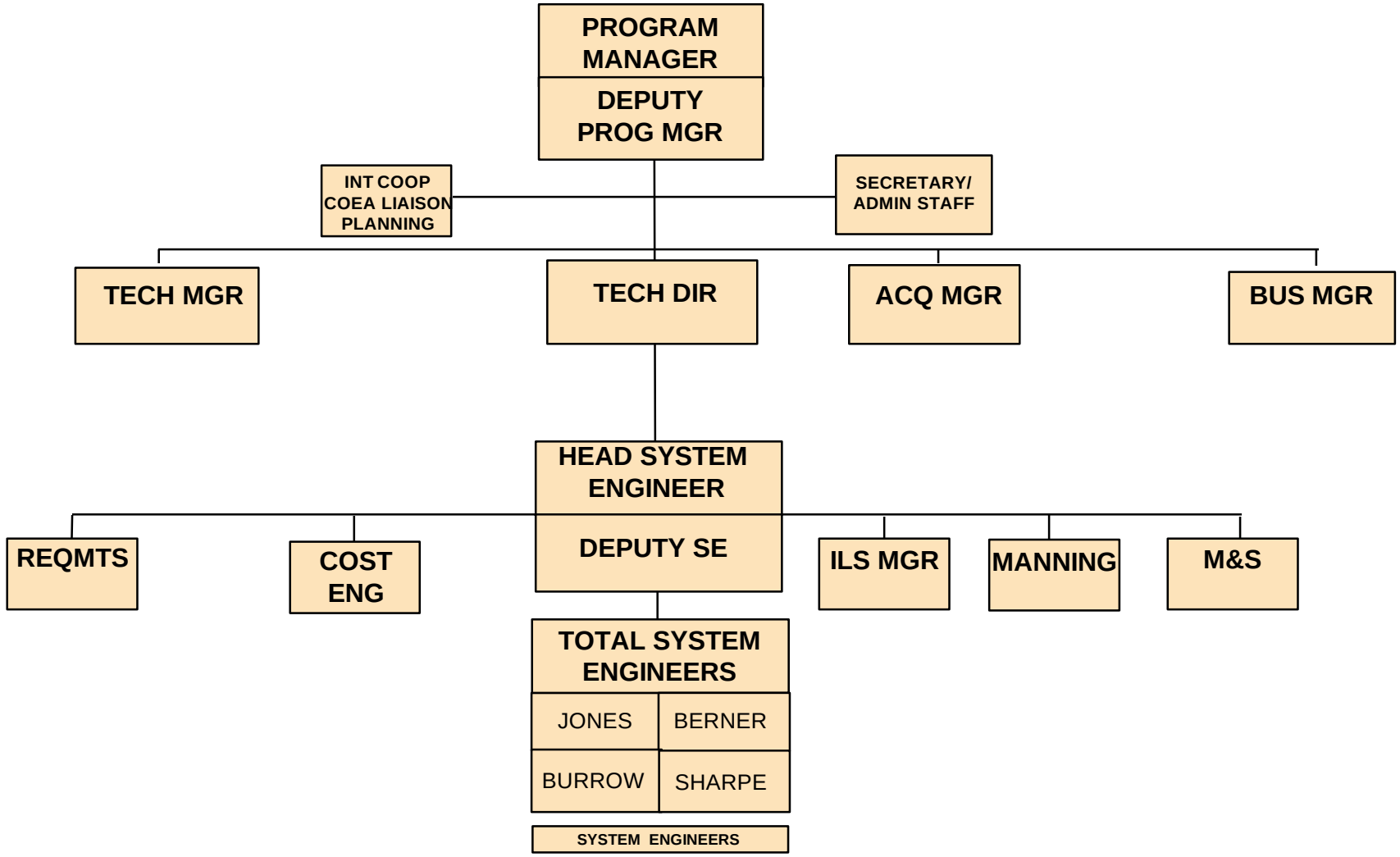
SC21 TEAM


JOINT
FLEET
ALL DoD
INDUSTRY
SC-21 PMO
NAVSEA
PEO(SC-AP)
PEO (TAD)
PEO (USW)
PEO (MIW)
PEO (CU)
OPNAV
SPAWAR
HANSCOM AFB
MIT/LL
NUWC
NWC
CEP
NSWC/DD
NSWC/CD
NRL
ONR
ARPA
MCCDC
ONI
NAVSEA
SPAWAR
JHU/APL
SPACE COMMAND
JWAC
NSWC/CR
ATC
COMNAVSURFLANT
CINCLANTFLT
SWDG
COMNAVDOCCOM
CHERRY POINT
USMC
MICOM
HUNTSVILLE
NPS
FALLON NAS
NAWC/CL
TINKER AFB
NSWCPHD
FT. HUACHUCA
FT. SILL
NRaD
SPECWARCOM
COMNAVSURFPAC
USAADSCH
FT. BLISS
EGLIN AFB
NSWCDD/CSS
NAWC-TSD

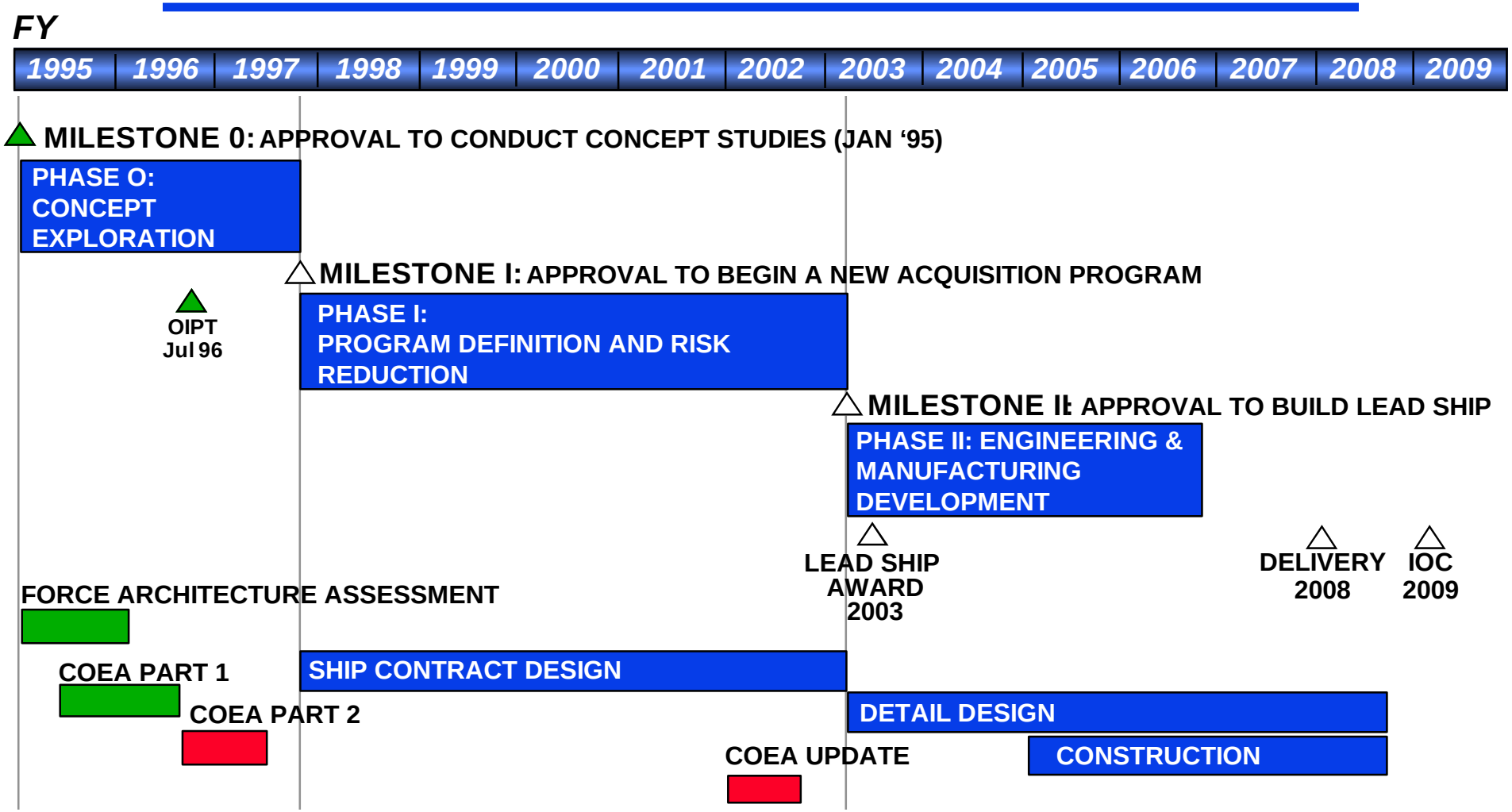
PEO SC/AEGIS PM ORGANIZATION



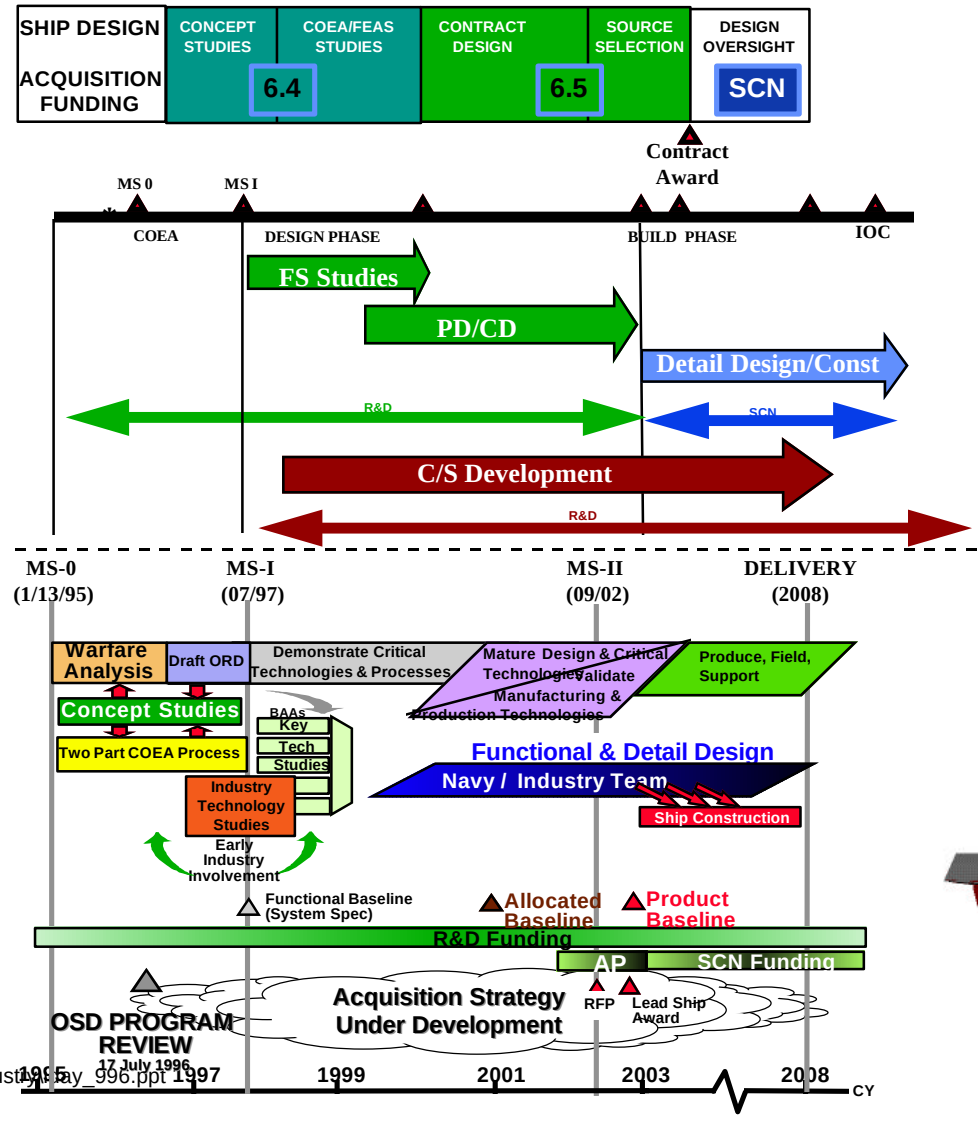
SC-21 ORGANIZATION CHART PHASE 0

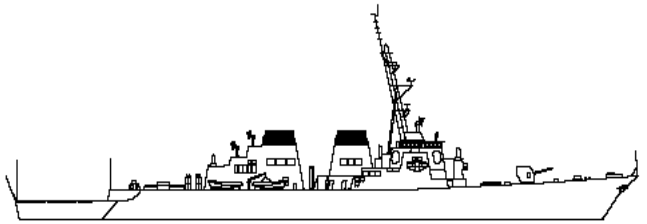


SC-21 MASTER SCHEDULE

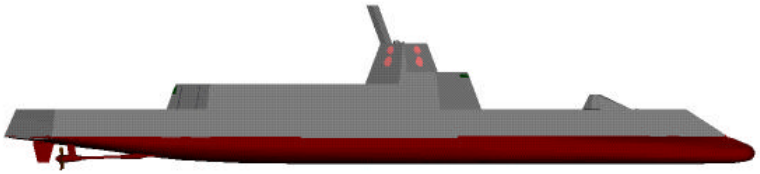


NEW Way of Doing Business



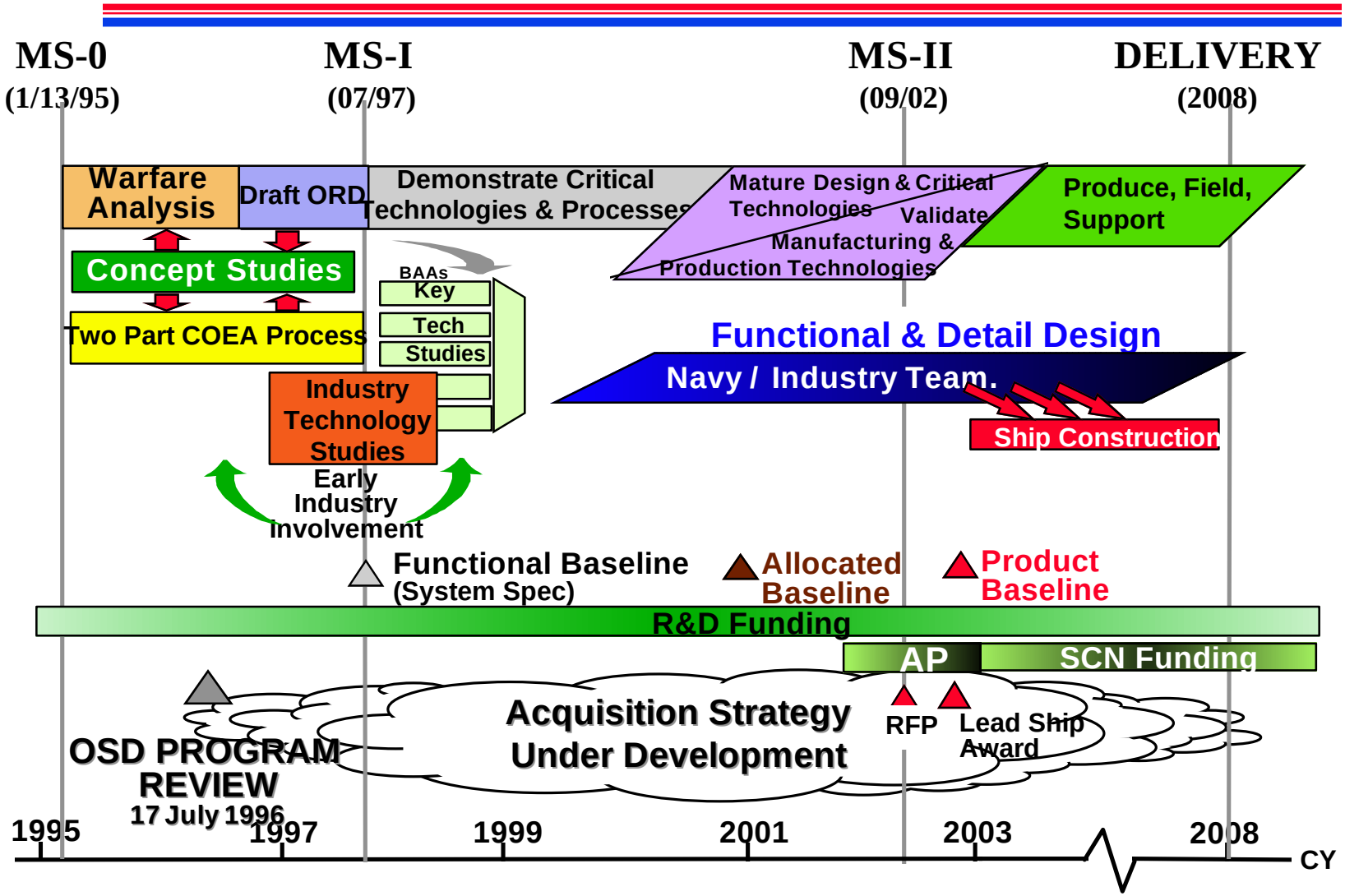


PREVIOUS

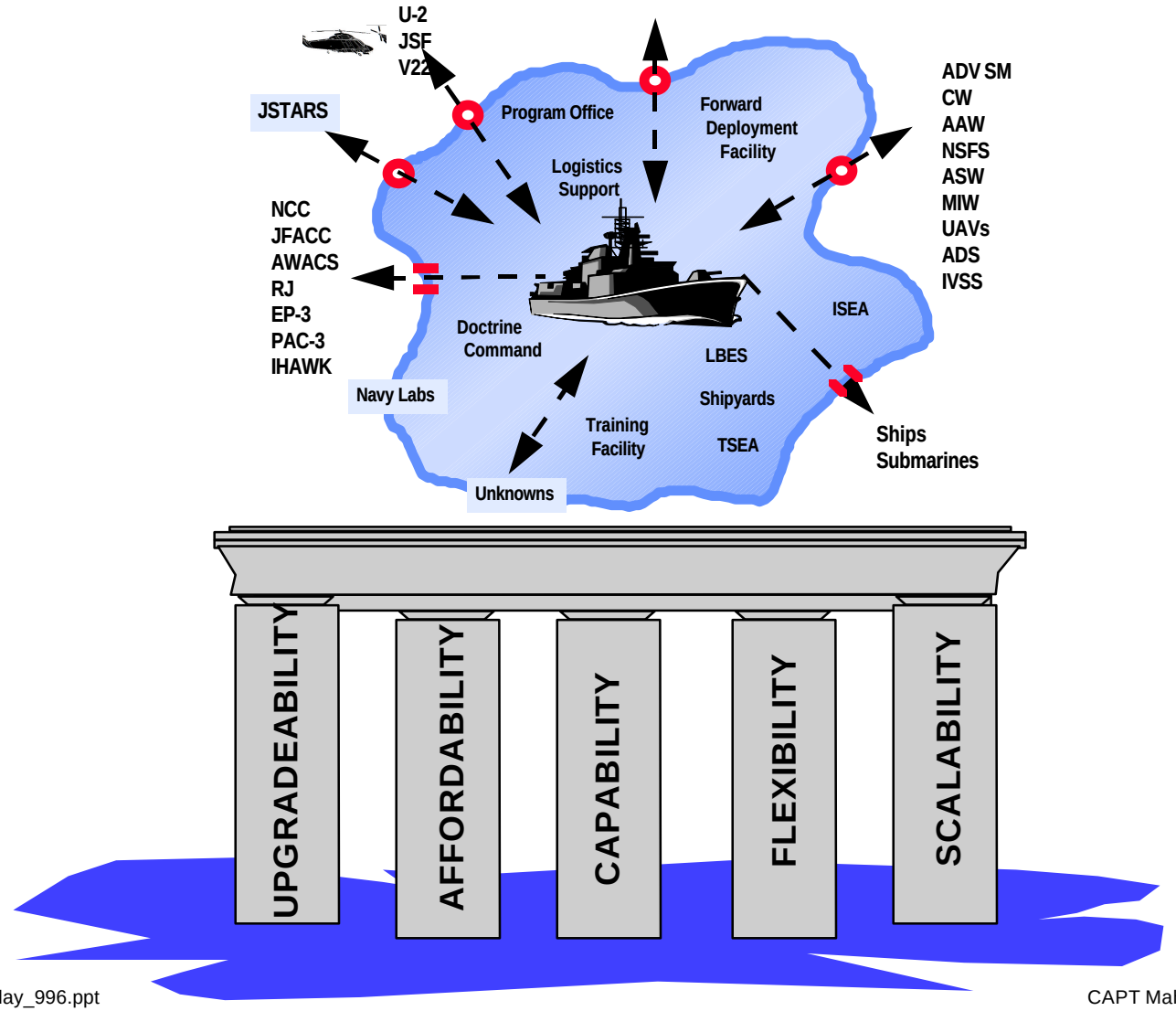


NEW

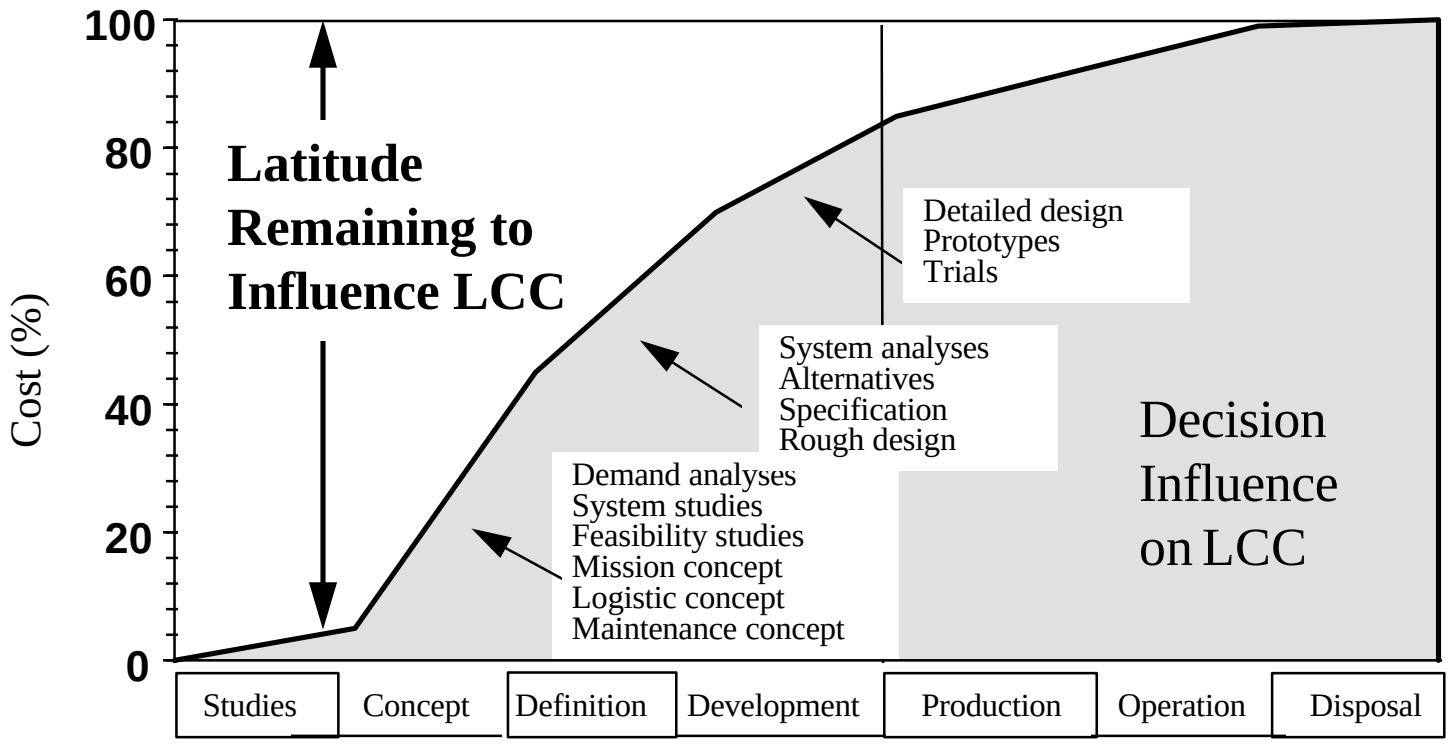
Lead Ship Development Timeline



PROGRAM OBJECTIVES



MISSION NEED - THE BASIC COST DRIVER



~ 80% or more of ship life cycle cost determined by end of design development phase

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

SC-21
COEA

Presentation

Not

Provided

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

System Threat Assessment Report

Presentation

Not

Provided

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

System Engineering Overview

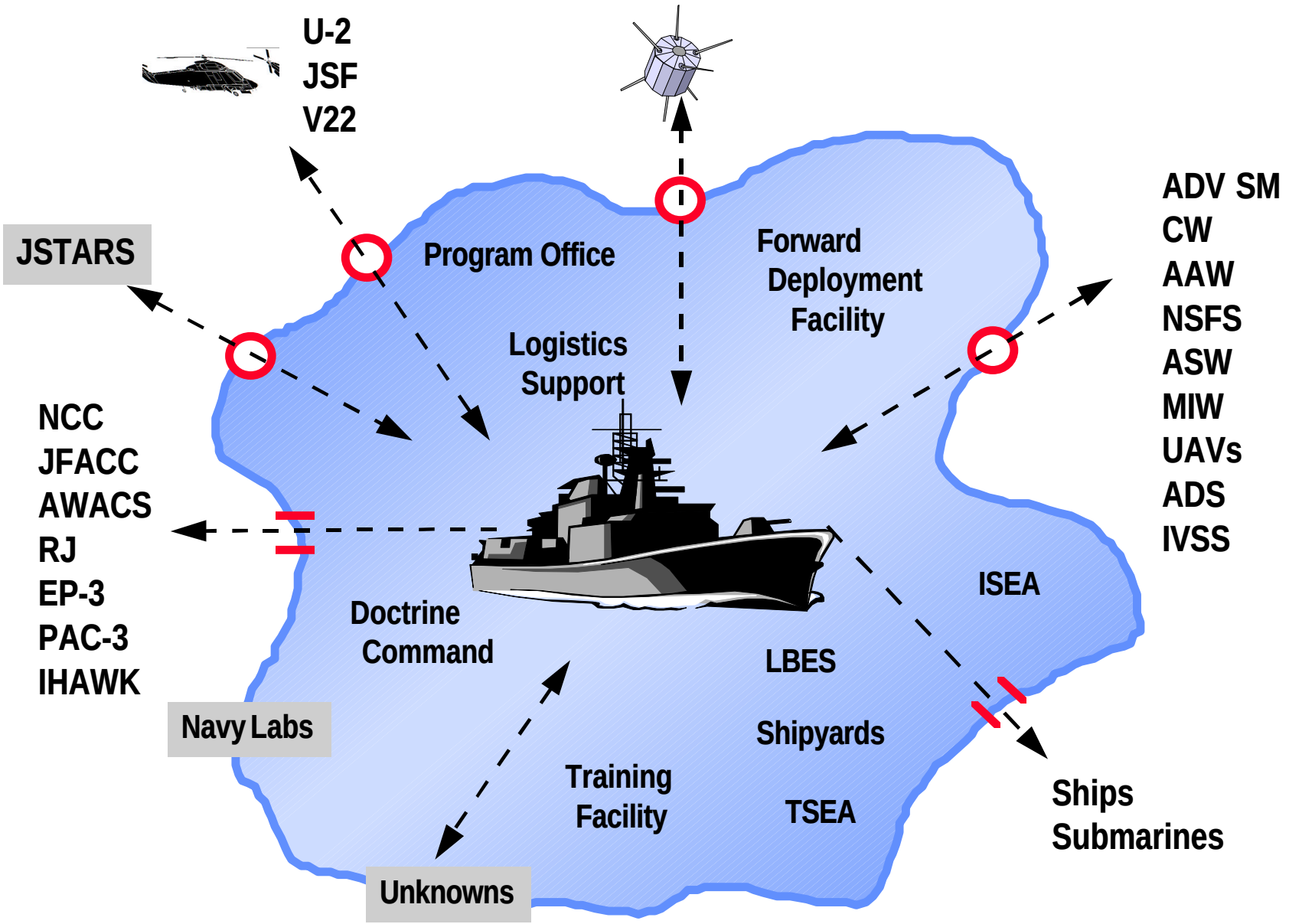
- Goal for Today's Presentation
  - SC-21 System Engineering Effort
    - » Technical Management Planning
  - Principal Products (Phase 0)
  - Opportunities for Industry Participation
  - Technology
    - » Signatures (LCDR Roger McGinnis)
  - Technical Feasibility Model (CDR Joe Berner)

Mission Need Statement

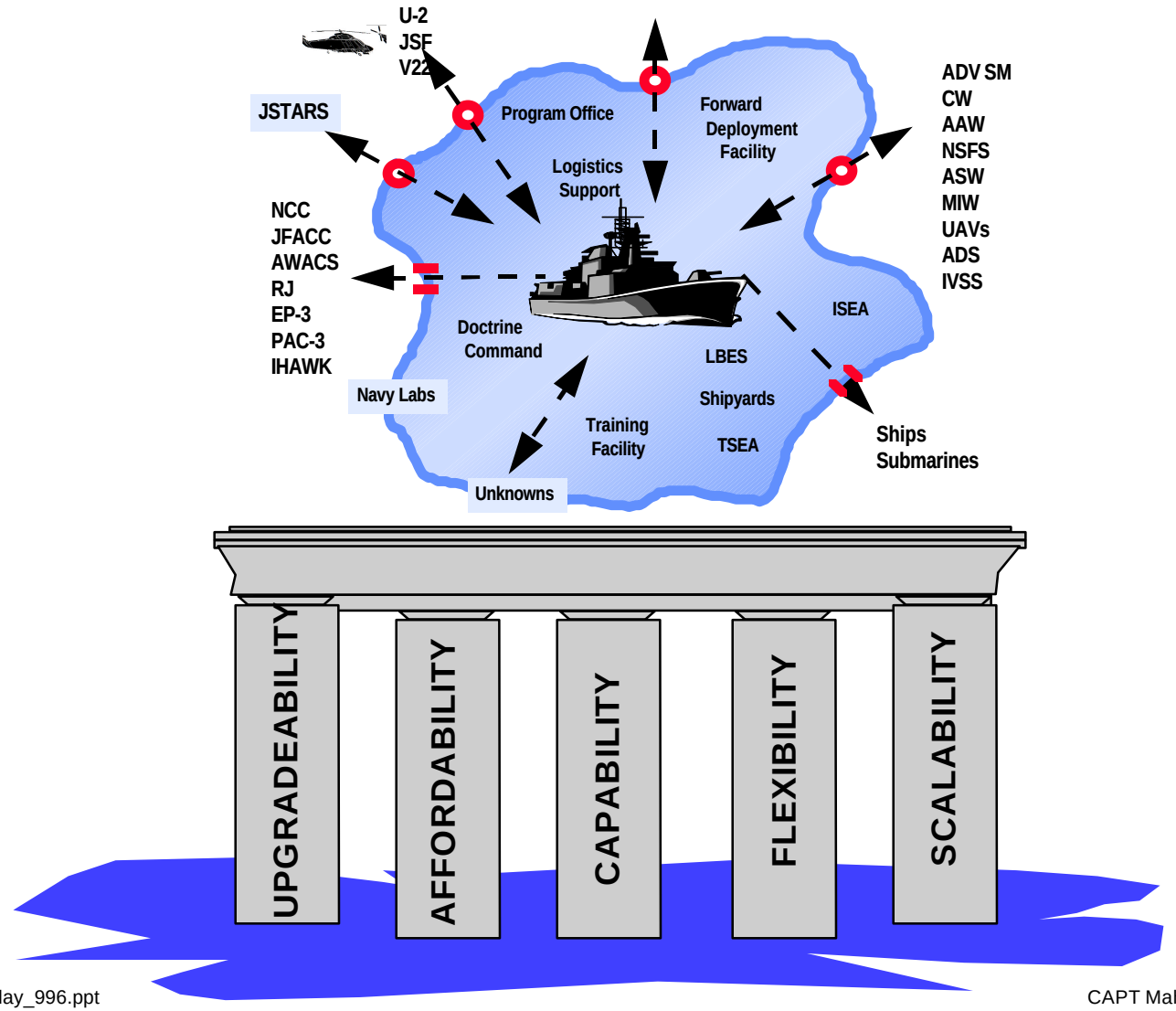
- TOTAL SURFACE COMBATANT FORCE WARFIGHTING CAPABILITY
- IDENTIFIED DEVELOPMENT CONSTRAINTS
  - ARCHITECTURE
    - » OPEN
    - » MODULAR
  - DESIGN
    - » COMMONALITY (MODULAR)
    - » AUTOMATION
    - » EASILY UPGRADED - MAINTAIN TECH PACE
  - PERSONNEL
    - » SIGNIFICANT MANPOWER REDUCTION

COMMON TO ALL SC 21 CONCEPTs

THE SC-21 "SYSTEM"

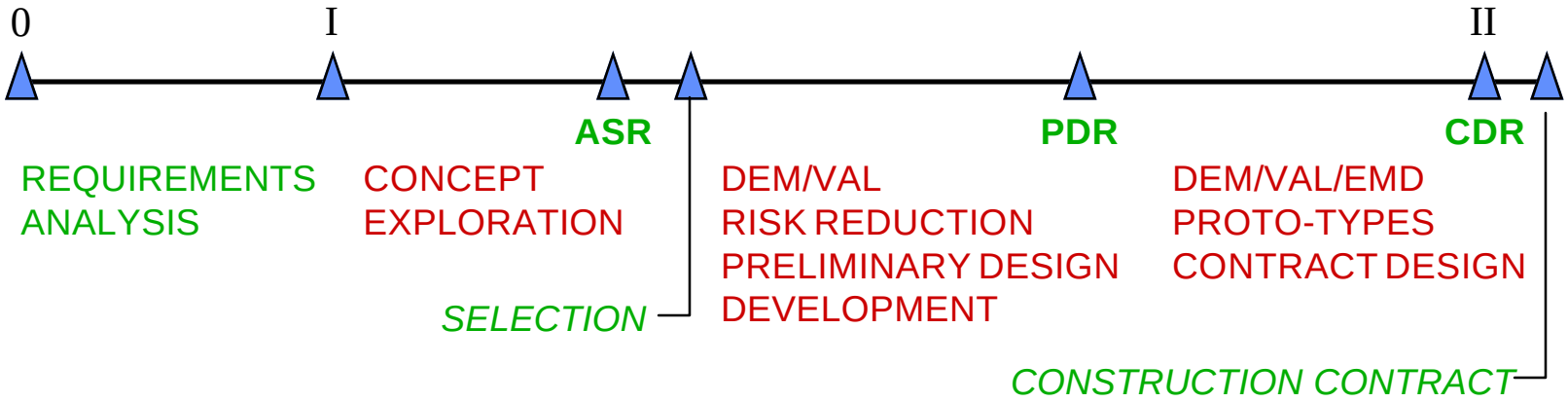


PROGRAM OBJECTIVES



Technical Development Overview

- **Approach**
  - **Phase I Navy / Industry Team Effort**
  - **Tailored Milestones for System and Subsystem Development**
  - **Navy SYSCOMs/Labs in IPPD Teams plus:**
    - **» Oversight**
    - **» Technical Support**



Phase 0 Technical Development Efforts

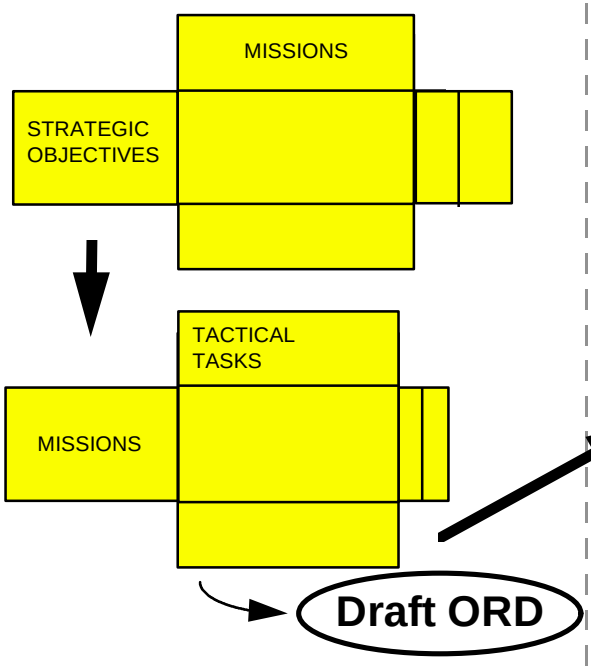
- **Focus - Requirements Analysis**
  - **Analyzing Need**
  - **Identifying Constraints**
  - **Defining Operational Scenarios**
  - **Defining Functional Requirements**
  - **Defining Performance Requirements**
  - **Identifying Critical Technology Areas**
  - **Developing System Performance Specification**
  - **Establishing a Technical Feasibility Model**
  - **Identifying/Defining TPMs**
  - **Developing the SEMP**
  - **Developing Acquisition Documentation**

SC-21 REQUIREMENTS FLOWDOWN

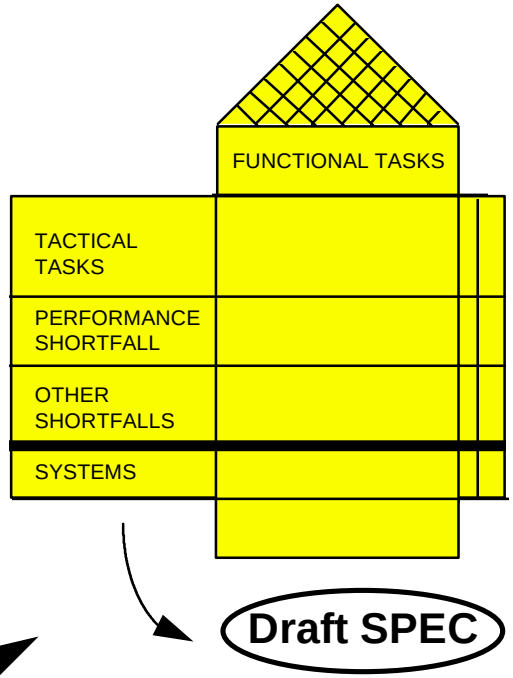
CONOPS

- Baseline
- Peacetime
- IBG/Crisis Response/ Mil Preparedness
- Wartime

Needs
(FLEET/OPNAV INPUT)

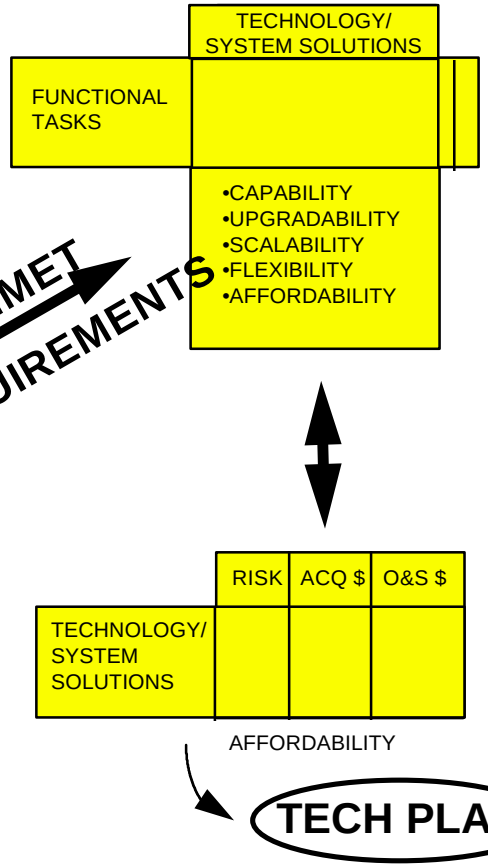


Characteristics
(SC-21 IPT/SEFT INPUT)

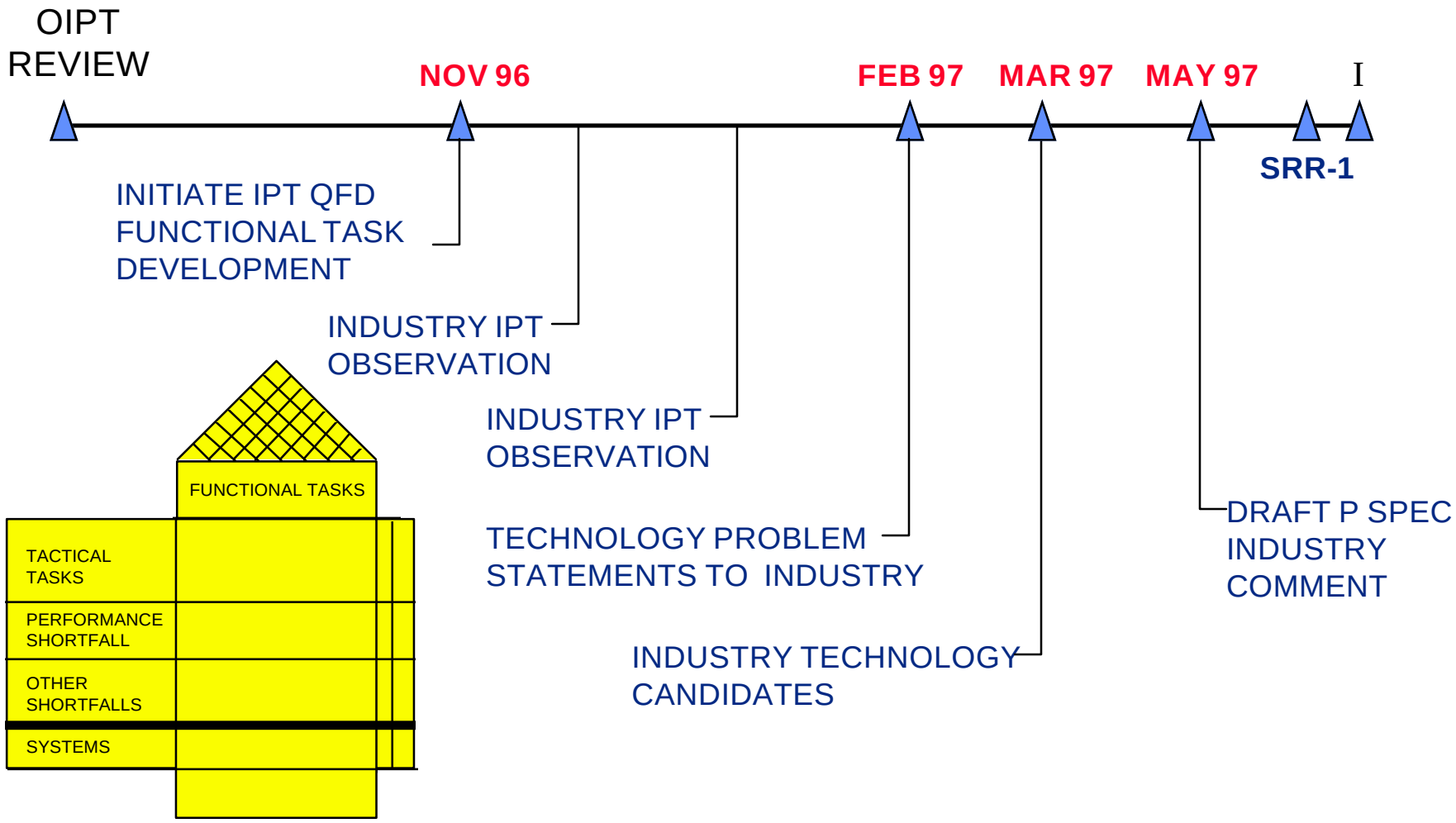


Manning Reduction Study
C4ISR Study
ILS Study
Modularity Study
Computational Plant Study
Survivability Study

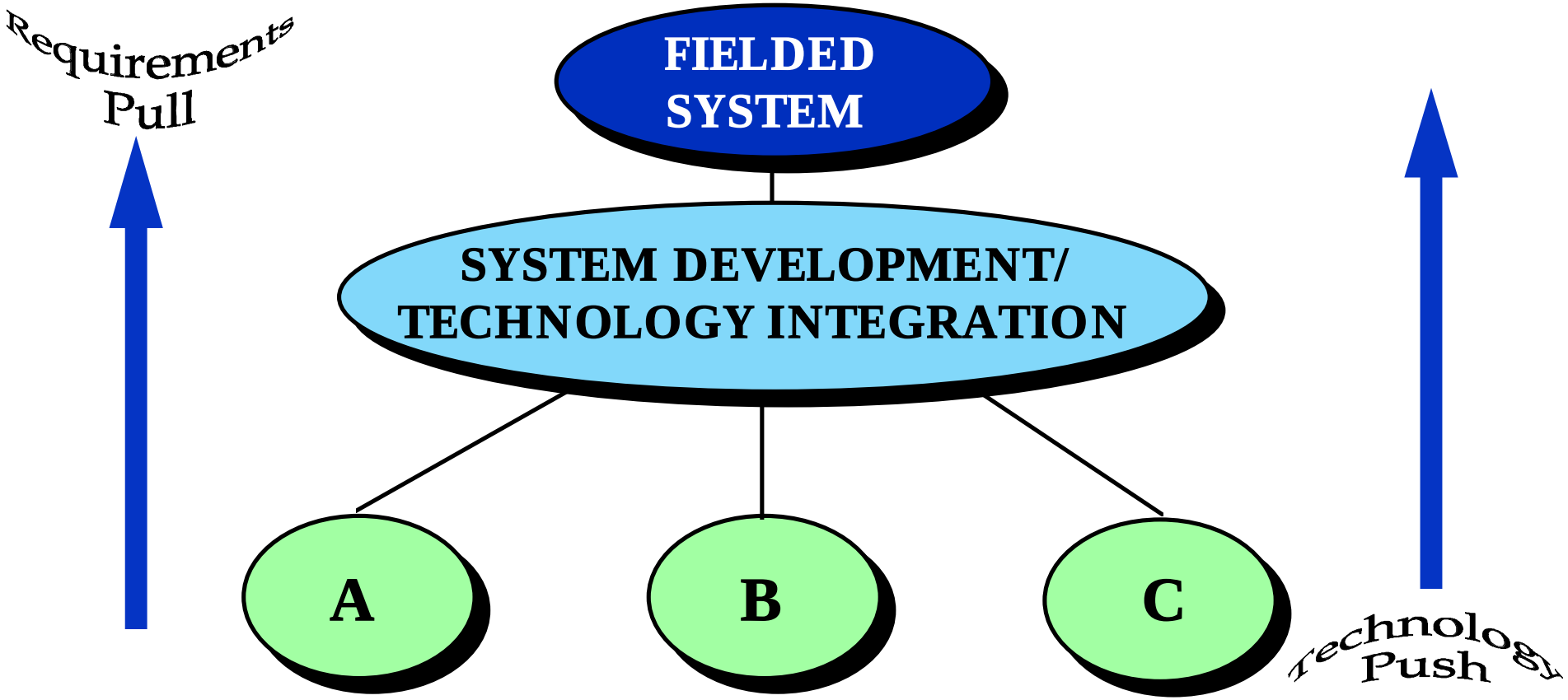
Solutions
(SYSCOM/ONR/DARPA/ INDUSTRY INPUT)



OPPORTUNITIES FOR INDUSTRY PARTICIPATION



SHIP SYSTEMS DEVELOPMENT PROCESS



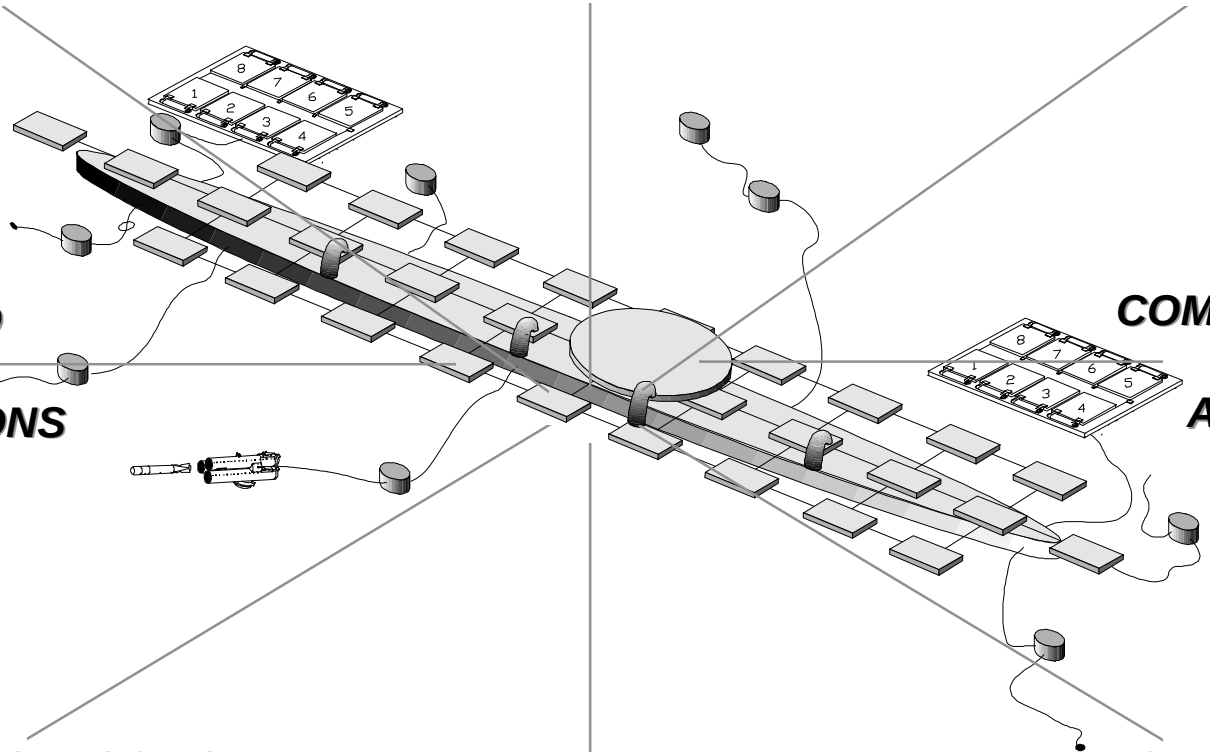
ENABLING TECHNOLOGIES

TOTAL SHIP ENABLERS

SHIPWIDE COMPUTER/ DISPLAY ARCHITECTURE

INTEGRATED TOPSIDE DESIGN

MULTI-FUNCTION WEAPONS LAUNCHER



INTEGRATED JOINT COMMUNICATIONS

COMMAND SPACES DESIGNED AS UTILITIES

INTEGRATED SENSOR SUITE

STEALTH

AUTONOMICS AND EMBEDDED TRAINING

. . .ALL SYSTEMS MUST BE INTEGRATED TO CARRY OUT ASSIGNED MISSION TASKS

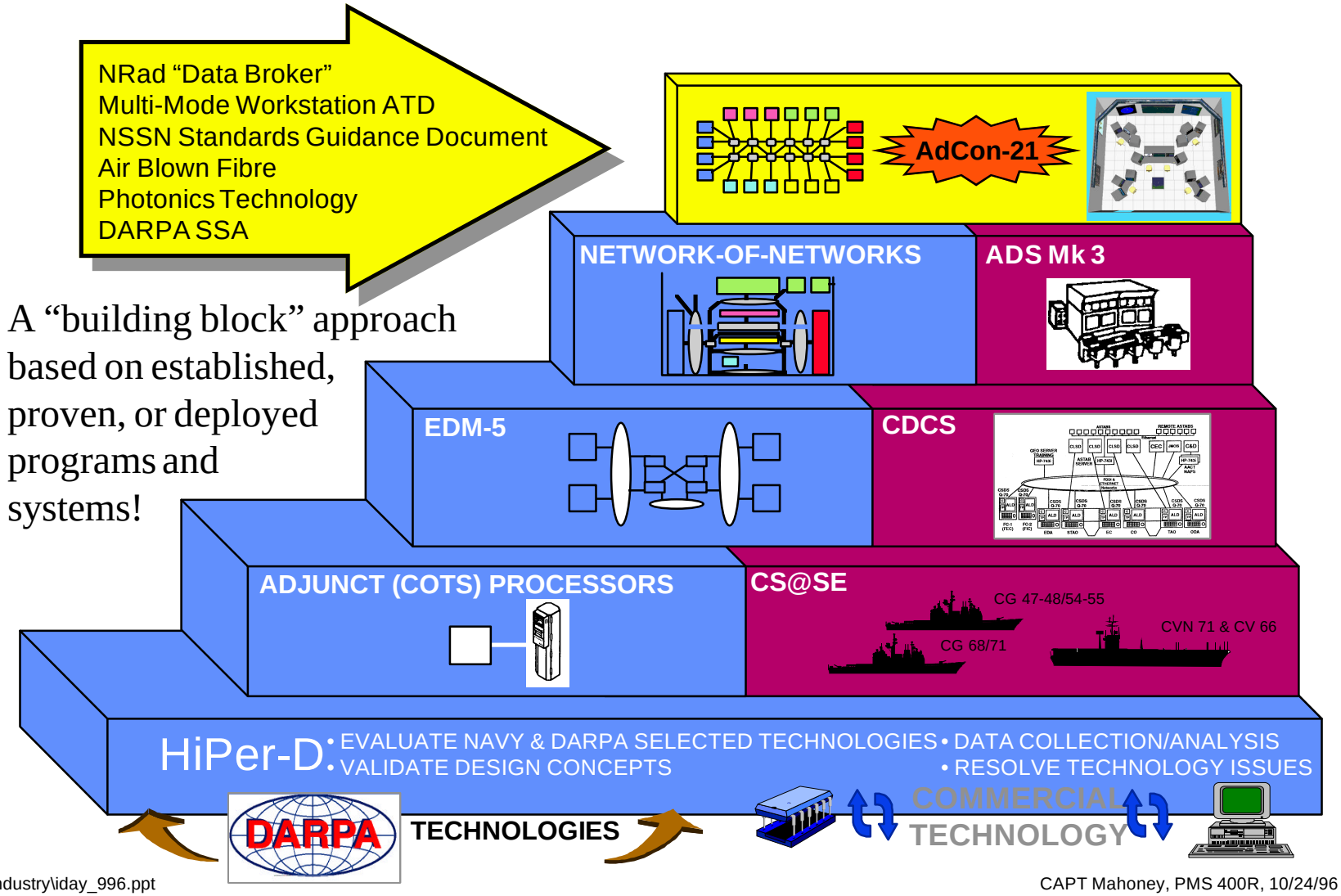
Technology - Long Poles

- Integrated Computational Plant - Longest Pole
  - Must Lead Other Systems - LBTS
- Integrated Topside
  - ATDs
  - Transition planning
- Reduced Manning Technologies
  - Smart Ship
  - S&T Affordability
  - Demonstration

Advanced Control - 21st Century

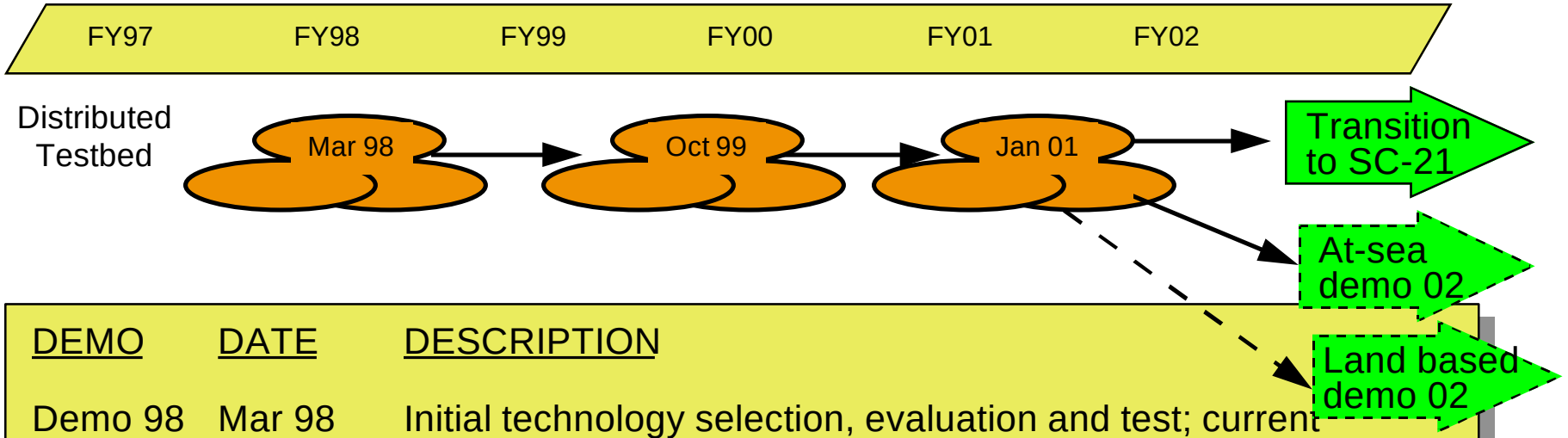
NRad "Data Broker"
Multi-Mode Workstation ATD
NSSN Standards Guidance Document
Air Blown Fibre
Photonics Technology
DARPA SSA

A "building block" approach based on established, proven, or deployed programs and systems!



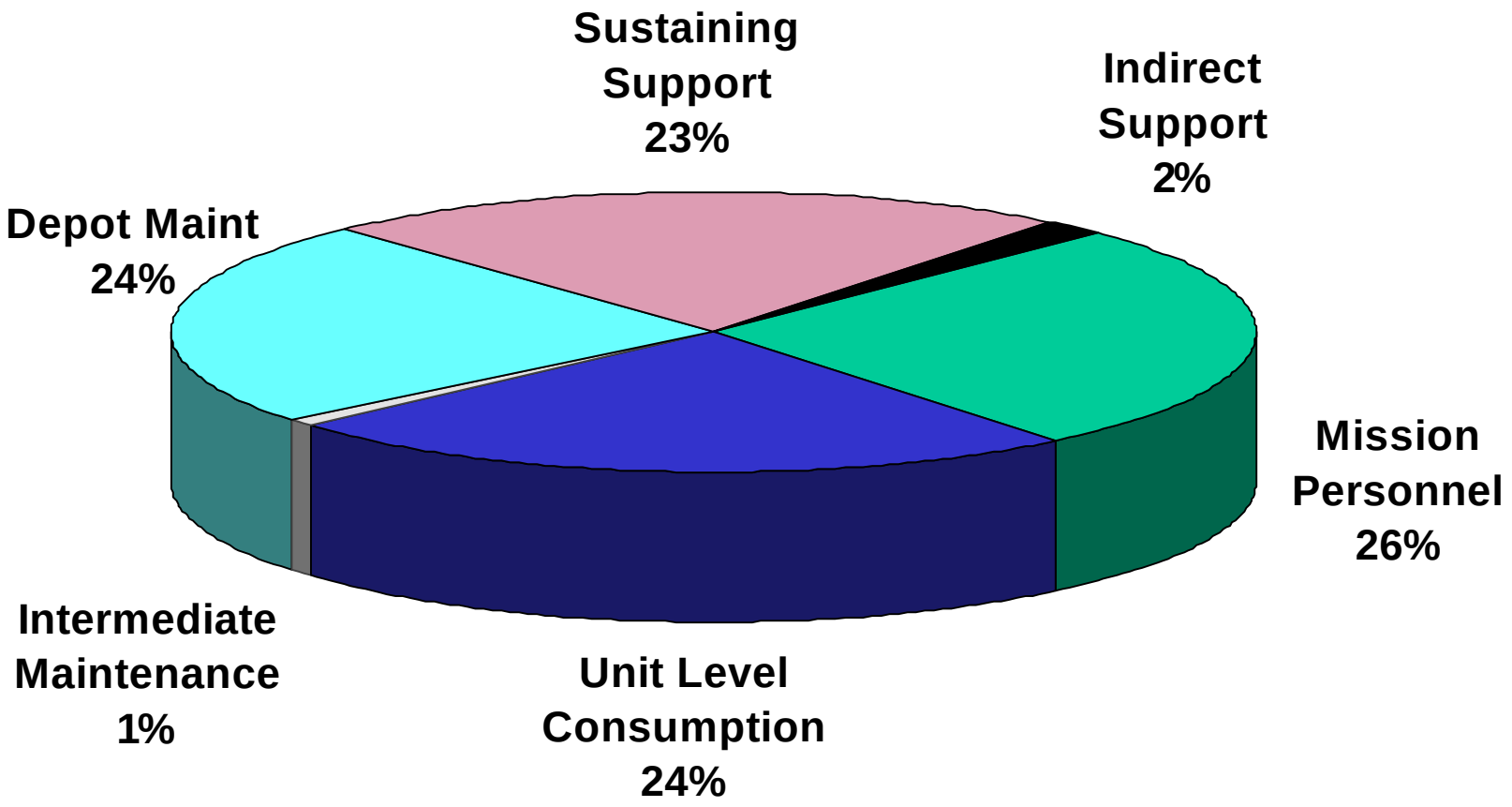
ADVANCED CONTROL-21

DEMONSTRATIONS



DEMO	DATE	DESCRIPTION
Demo 98	Mar 98	Initial technology selection, evaluation and test; current HiPer-D functionality plus one additional Navy function (TBD)
Demo 99	Oct 99	Basic computing infrastructure for SC-21 with initial selected ship systems from PARMs
Demo 01	Jan 01	Enhanced computing infrastructure with systems from all PARMs; Total ship system engineering prime contractor involved

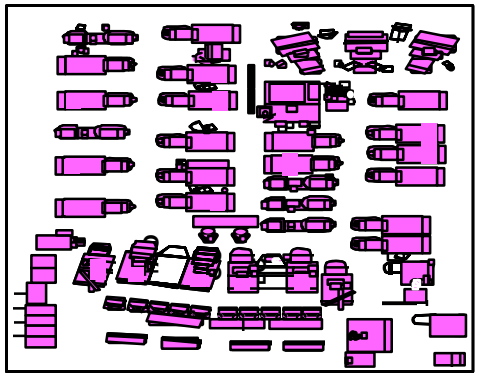
Typical Combatant O&S Costs



SC-21 MANNING INITIATIVE

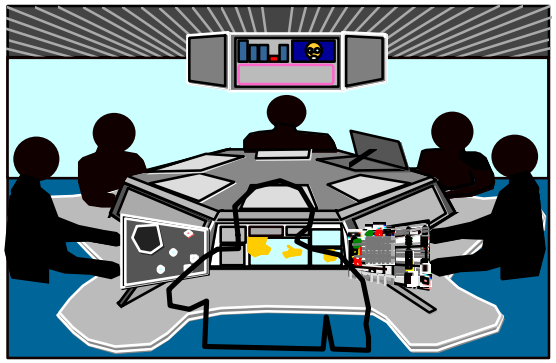
LARGE LIFE CYCLE SAVINGS FROM REDUCED MANNING

PRESENT CIC



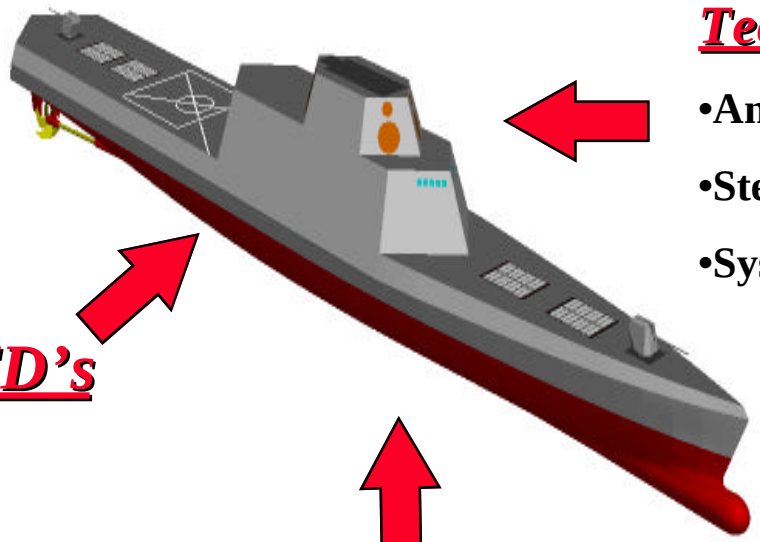
S&T Brief to OPNAV

FUTURE CIC



REVOLUTIONARY APPROACH

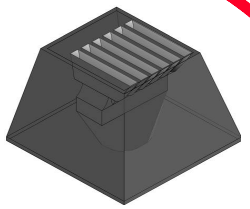
SC 21 Topside Leveraging



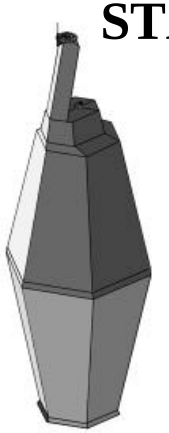
Technology Base

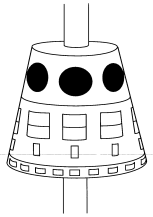
- Antennas (aircraft)
- Stealth Integration
- Systems Engineering Tools
  - Modeling & Simulation

ATD's



STACK-98?





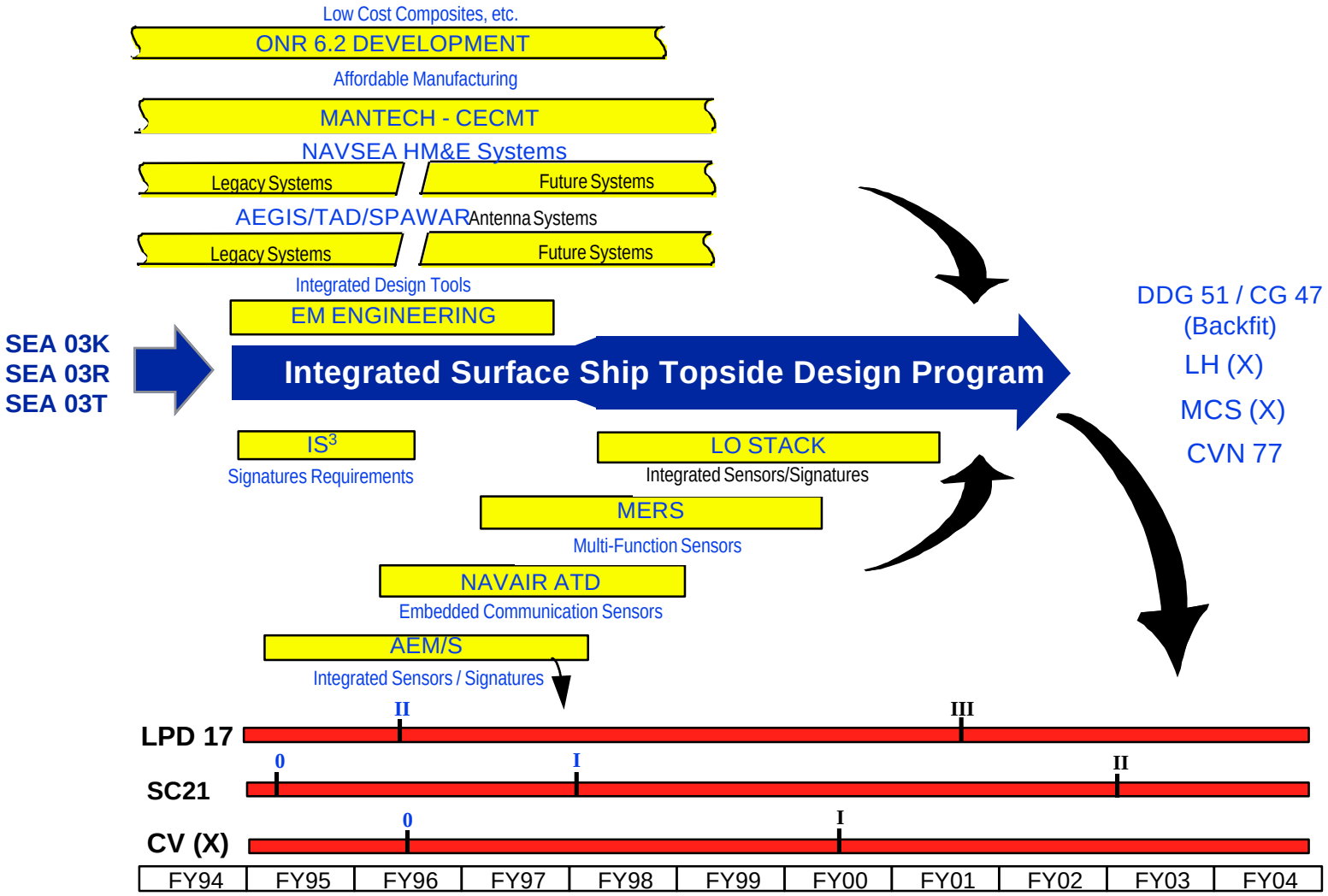
MERS-97

AEM/S-95

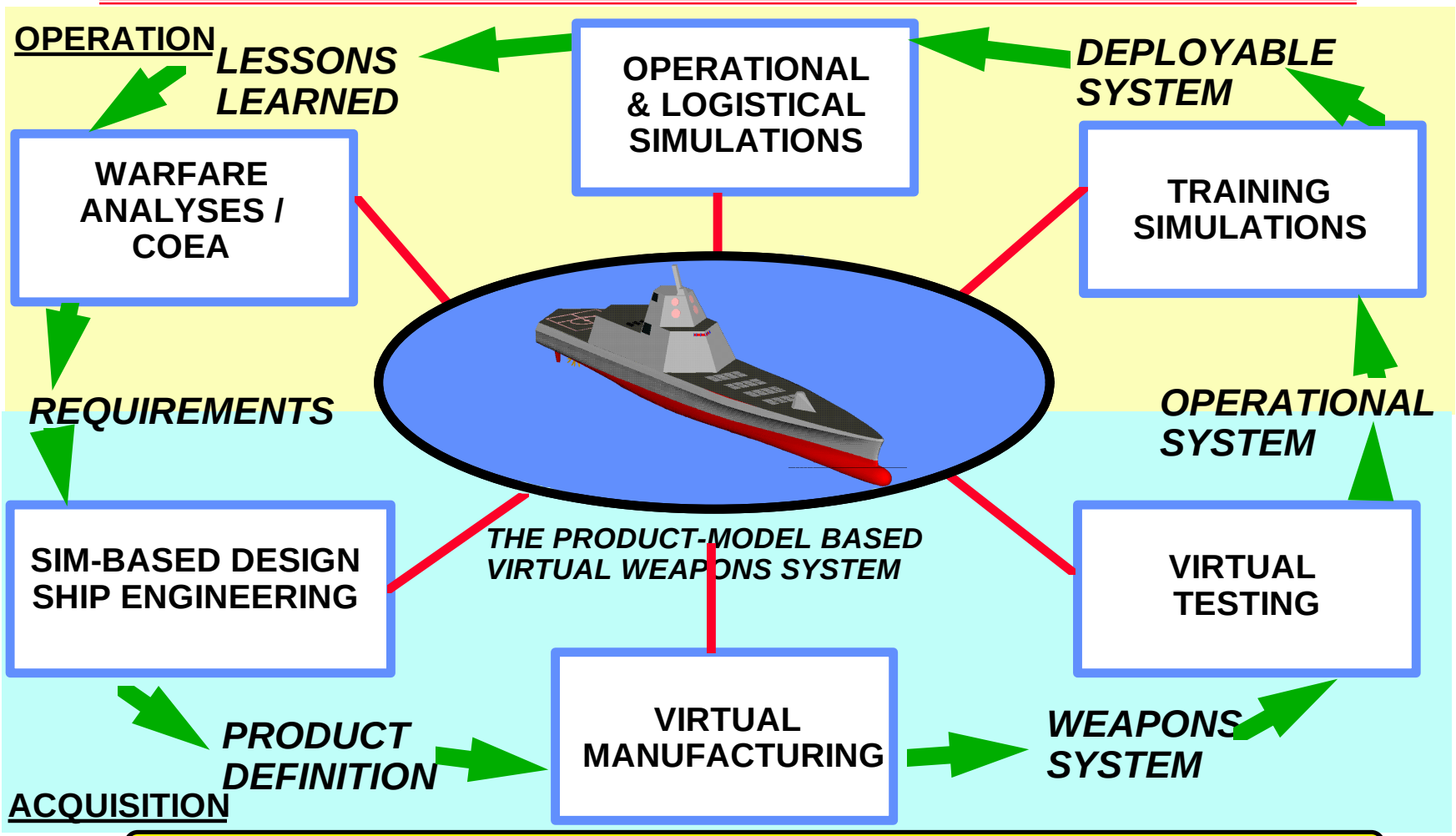
Program Activities

- Integrated Surface Ship Topside Design N86 (PE0603513N-POM98) (*program realignment)
- Ship Concept Advanced Design N86 (PE0603563N)
- Integrated Ship Signature Study (IS3) CNO Sponsored
- Shipboard Multi-function Apertures ONR 31

Integrated Topside Transition Strategy

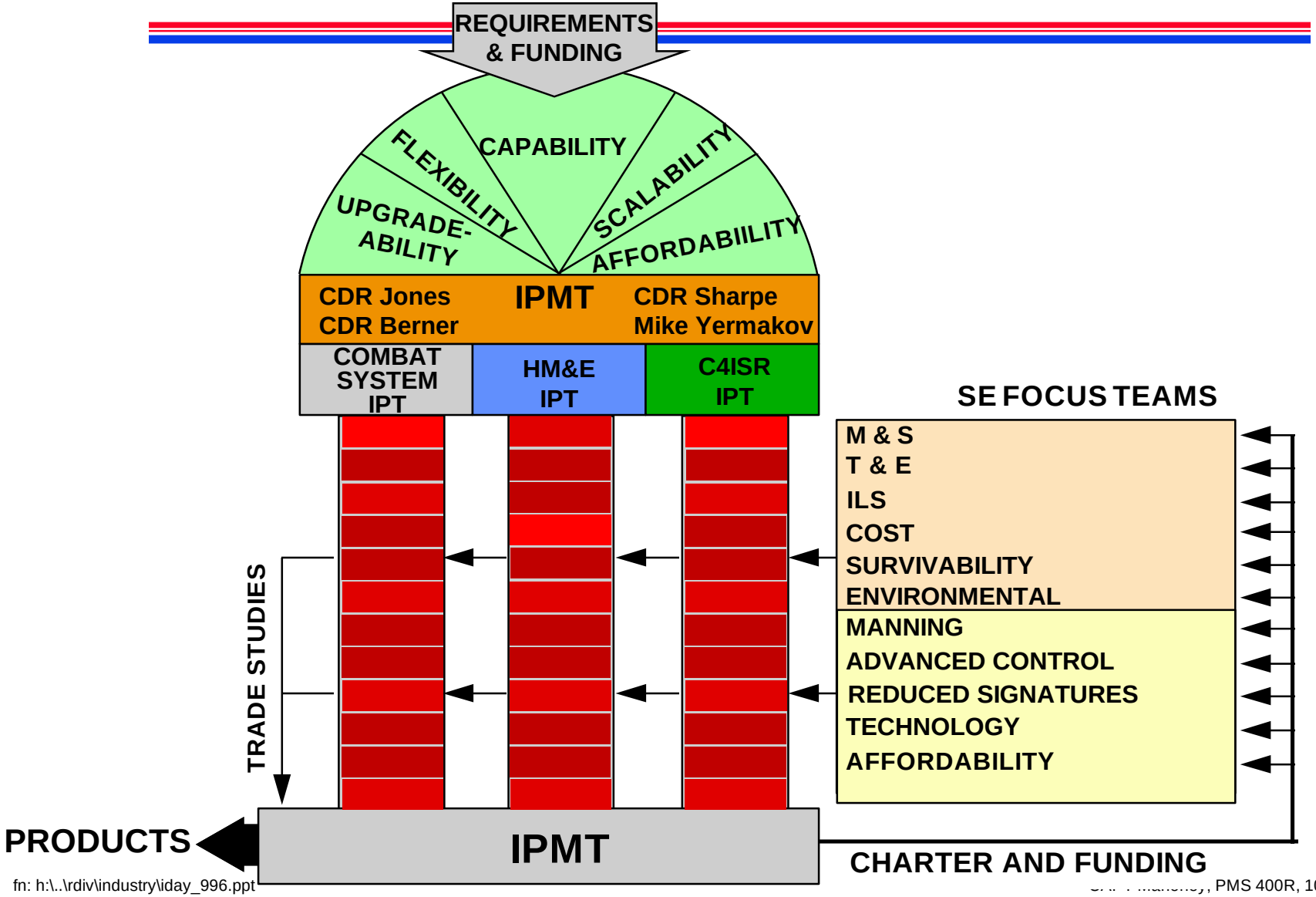


SIMULATION-BASED DESIGN- THE VIRTUAL SHIP LIFE CYCLE



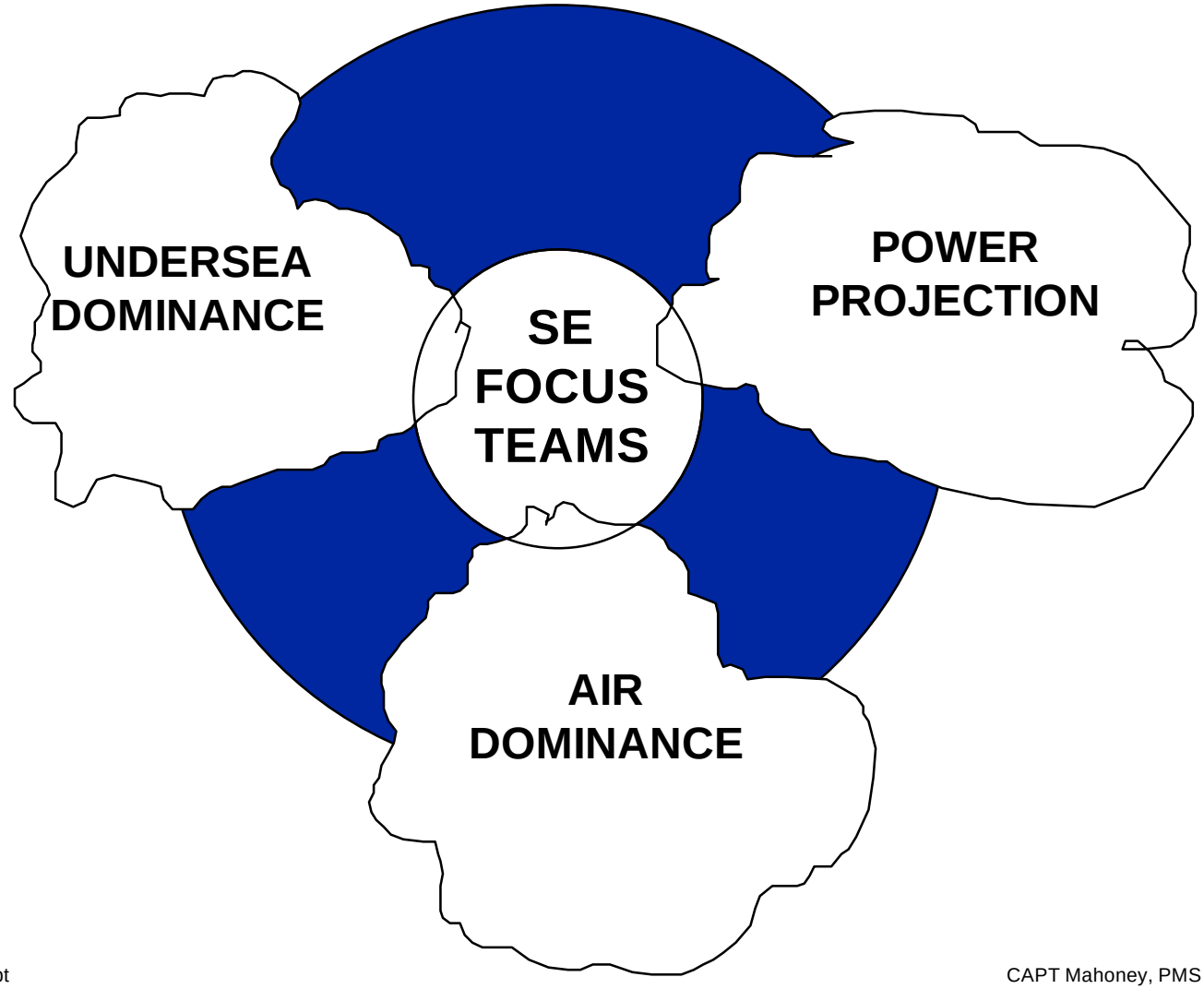
VISION: CONCEIVE, DESIGN, BUILD, TEST, TRAIN, AND OPERATE A WEAPONS SYSTEM IN A COMPUTER

SC-21 SYSTEM ENGINEERING STRUCTURE



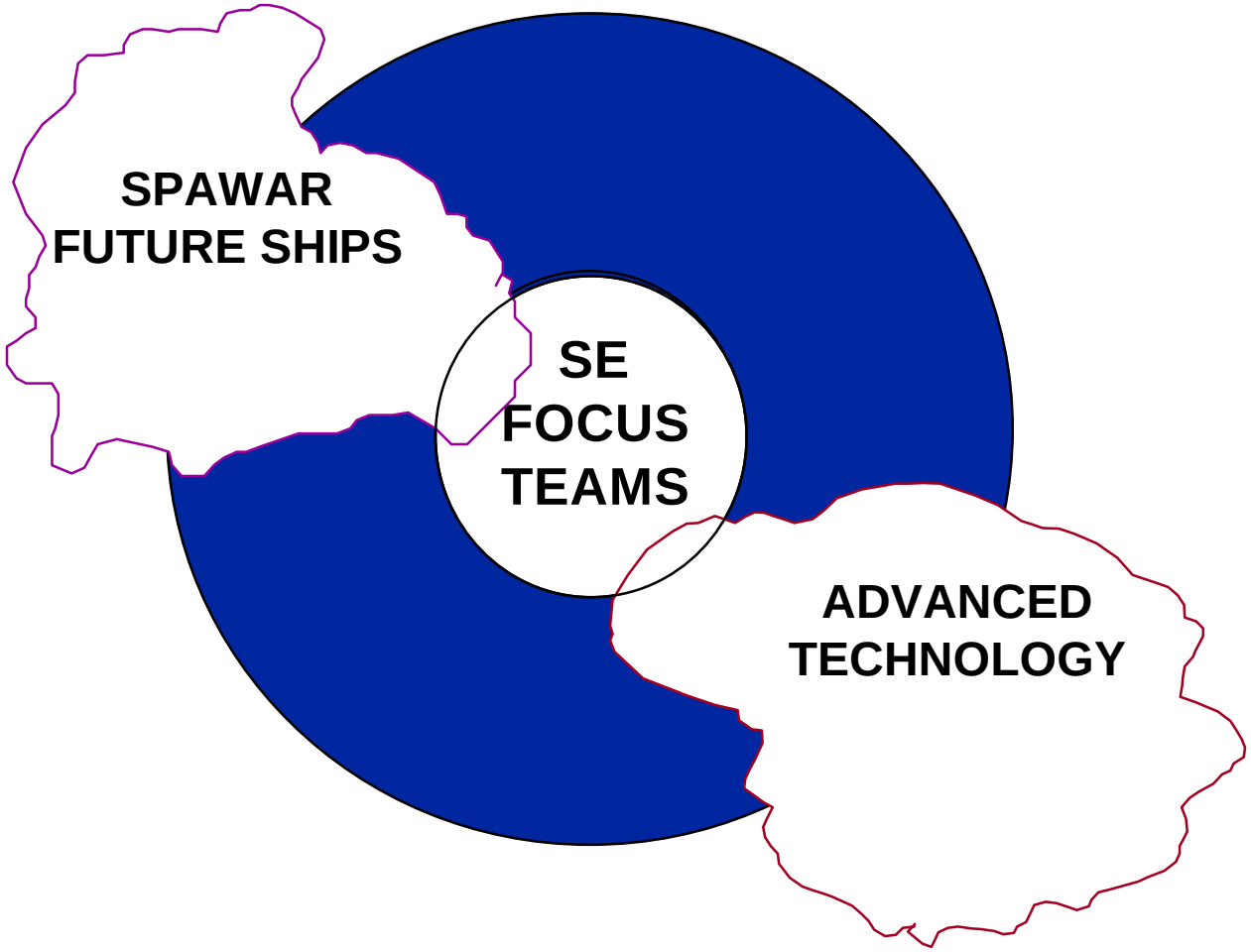
COMBAT SYSTEM IPT

CDR Steve Jones



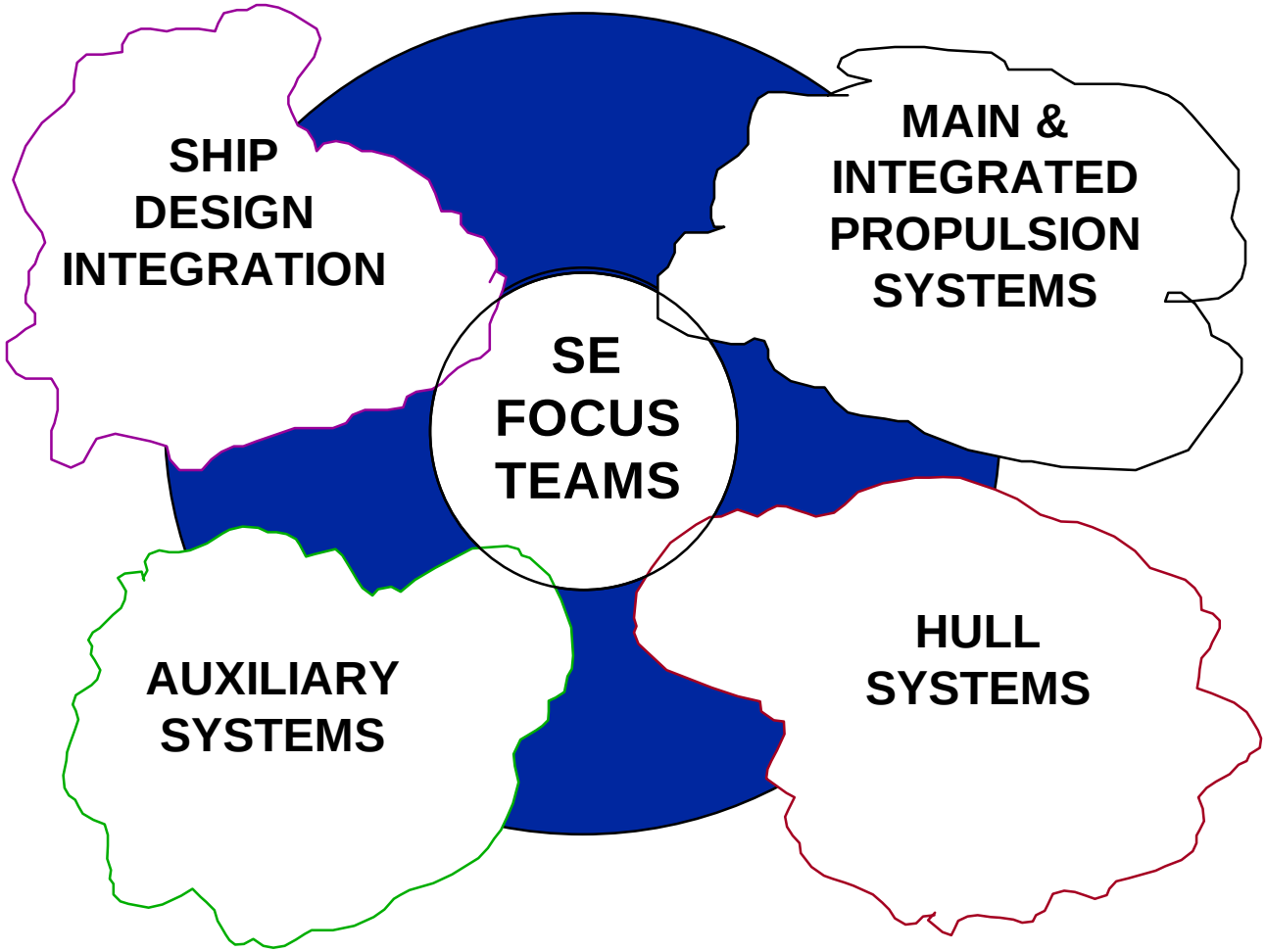
C4ISR IPT

CDR Jon Sharpe

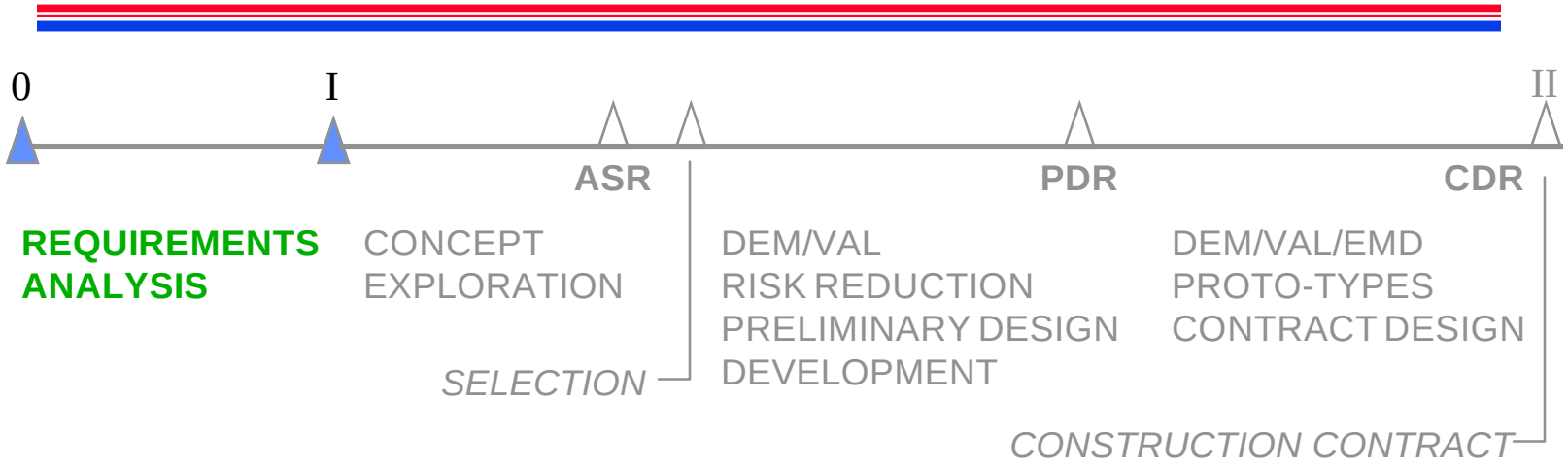


HM&E IPT

CDR Joe Berner

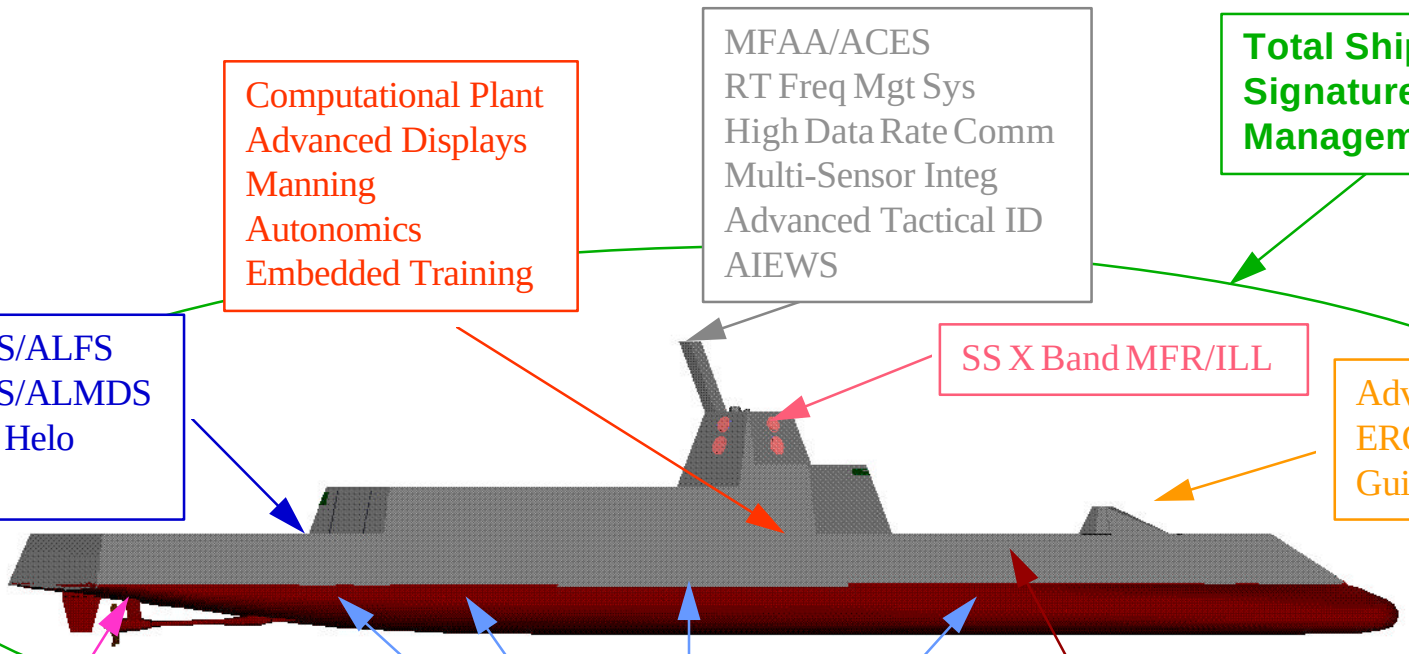


MS I - EXPECTATIONS



- **Ready to Release RFP to Industry for Concept Proposals**
  - **Firm Understanding of the Requirements**
  - **Understanding of Key Performance Parameters**
  - **Concept Evaluation Models (MOEs and MOPs)**
  - **Educated Vendors**

TECHNICAL FEASIBILITY MODEL



Computational Plant
Advanced Displays
Manning
Autonomics
Embedded Training

MFAA/ACES
RT Freq Mgt Sys
High Data Rate Comm
Multi-Sensor Integ
Advanced Tactical ID
AIEWS

Total Ship Signatures Management

LAMPS/ALFS
LAMPS/ALMDS
Armed Helo
UAV

SS X Band MFR/ILL

Advanced Gun
ERGM
Guided Projectile

LBVDS
SSTD

Modular Design
STD Monitoring & Control System
IPS
Advanced Fuel Efficient Gas Turbines

SM-2 BLK IVA
Theater TBMD MSL
High Kinematic MSL
Tomahawk BLK IV
TSTAR
ASUW MSL

- **ILS CONCEPT**
- **TECHNOLOGY PLAN**
- **MANNING REDUCTION PLAN**

System Engineering's Role

- **Analyze user's needs and translate them into design requirements at successively greater levels of detail**
- **Identify and define the functional characteristics of "*System*" hardware, software, facilities, data, personnel, etc ….**
- **Develop the physical and process descriptions needed to produce the "*System*"**

STABLE SET OF VALIDATED REQUIREMENTS

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

Ship Signature Requirements

Presentation

Not

Provided

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

MISSION NEEDS STATEMENT

- Power Projection
- Battlespace Dominance
- Command, Control, & Surveillance
- Survivability
- Mobility
- Fleet Support Operations
- Non-Combat Operations

COMPREHENSIVE JOINT REQUIREMENTS

Maritime Fire Support Ship
COMBAT SYSTEMS CHARACTERISTICS (U)

Air Dominance

- Volume Search Radar
- SPQ-9X
- MK99 ILLuminator Upgrade
- ESSM (Evolved Sea Sparrow Missile) Pl
- Advanced Decoys
- Advanced Integrated Electronic Warfare System (AIEWS) Increment 1
- Mk XII IFF Upgrade
- Cooperative Engagement Capability (CEC)
- Advanced Warfare Control System

Power Projection

- Advanced Tomahawk Weapon Control
- 2 x Mk 45 5”/62 Gun with ERGM*
- Armed Helicopters (SH-60R, Marine/Army Attack Helicopters)
- Special Operations Support
- UAV Launch/Control
- Mk 41 VLS - Fire Support Missile, ESSM Tomahawk Block III, IV, IVD/TSTAR
- AFATDS
- V-22 Landing Capable

* upgradeable to Vertical Gun (VGAS)

Sea Dominance

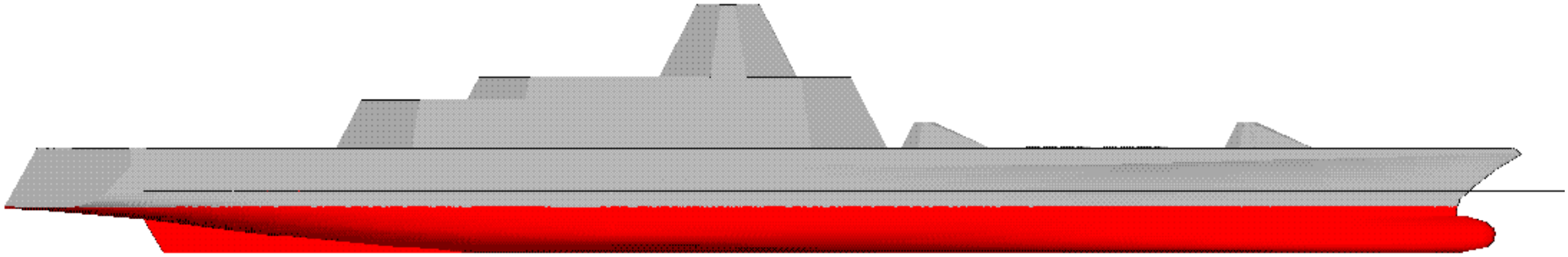
- Reduced Impact AN/SQS-53C Hull Sonar
- High Frequency Bow Sonar
- Light Weight Broadband Variable Depth Sonar (LBVDS)
- Multi-Function Towed Array (MFTA)
- ASW Torpedoes (Lightweight Hybrid Torpedo)
- Vertical Launched ASROC
- SSTD System (with Anti-Torpedo Torpedo)
- Thermal Imaging Sensor System (TISS)
- 2 x LAMPS Mk III SH-60R Helicopters
- Remote Minehunting System (RMS)
- Airborne Laser Mine Detection System
- Mine Acoustic Countermeasures (MACM)
- Advanced Degaussing
- Mk 38 25mm Guns (CIGS)

Command & Control

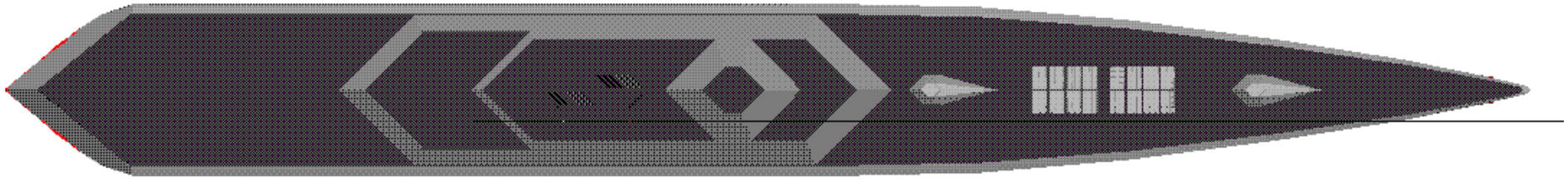
- LINKS 11, 16, 22
- JMCIS/GCCS
- UHF/EHF/SHF SATCOM
- BGPHES
- JMCOMS
- GBS
- TDDS
- CHBDL

Topside Configuration and Outboard Profile

Maritime Fire Support Ship (3D3)



Outboard Profile



Topside

Full Capability Combatant
COMBAT SYSTEMS CHARACTERISTICS (U)

Air Dominance

* Solid State Volume Multi-Function Radar (MFR)
* Solid State X-Band Horizon MFR/Illuminator
* Advanced Integrated Electronic Warfare System (AIEWS) Increment II
* Advanced Decoys
* MK 41 VLS (128 nominally):
  - ESSM P3I
  - SM-2 Block IVA
  - Theater Ballistic Missile Defense Missile
* Cooperative Engagement Capability (CEC)
* Identification System
* Advanced Control System

Command & Control

* Joint Maritime Command Information System
* Global Command and Control System
* Joint Tactical Information Distribution System/ Link 16
* NATO Improved Link-11/Link-22
* SHF/UHF/EHF SATCOM
* Joint Maritime Communication System
* Global Broadcast System
* Common High Bandwidth Data Link (CHBDL)/ Battle Group Passive Horizon Extension System
* Ship's Signal Exploitation Equipment
* Multi-Function, Multi-Beam Broadband Antenna
* Thermal Imaging Sensor System (TISS)
* Cryptologic Support System (CSS)
* Tactical Data Distribution System (TDDS)
* MMBA/MFAA

UnderSea Dominance

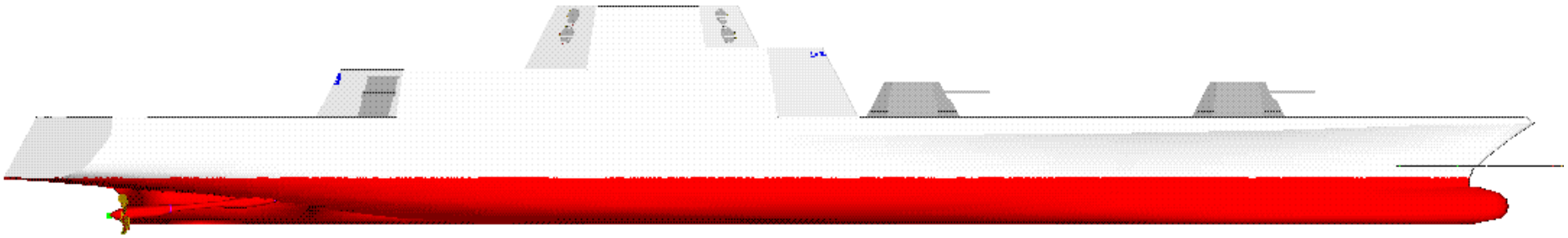
* AN/SQQ-89 Variant
* Light Weight Broadband Variable Depth Sonar (LBVDS)
* Broadband Hull Sonar
* High Frequency Bow Sonar (integrated into bow dome)
* LAMPS MK III - SH-60R (Level 1, Class 1)
* Airborne Laser Mine Detection System (ALMDS)
* Mine Acoustic Countermeasures (MACM)
* MK 41 VLS - Vertical Launched ASROC
* ASW Torpedoes (Lightweight Hybrid Torpedo/MK-50)
* Surface Ship Periscope Detection
* Mine Warfare Remote Minehunting System (RMS)
* Surface Ship Torpedo Defense Syste/Anti-Torpedo Torpedoes
* Advanced Degaussing

Land Attack/Surface Dominance

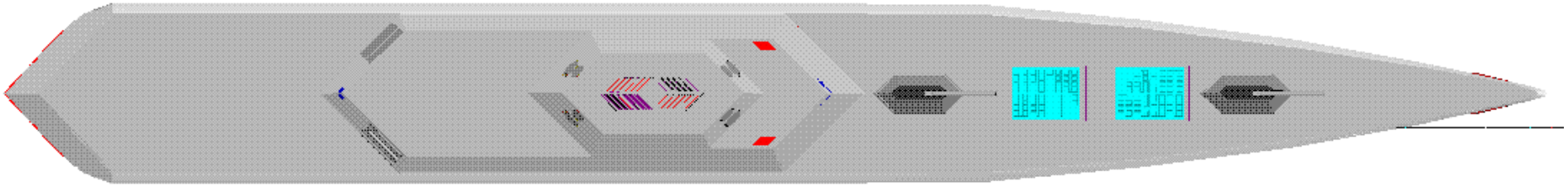
* Advanced Tactical Weapon Control System+
* MK 41 VLS
  - Tomahawk BLK III/IV
  - Tomahawk with Sensor Fused Weapons or Brilliant Anti-Tank (BAT) Munitions
  - Fast Response Missile
* Vertical Gun and Advanced Munitions
* Armed Helicopter (SH-60R, Marine/Army Attack Helicopters)
* Special Operations Forces Accommodation
* UAV Launch/Mission Planning and Control Station (MPCS)
* Close-In Guns System (CIGS)

Topside Configuration and Outboard Profile

Full Capability Combatant (3B1), REV A



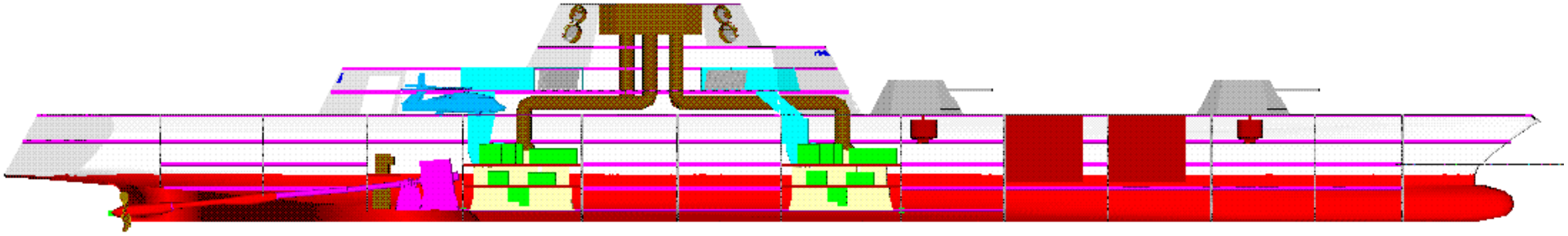
Outboard Profile



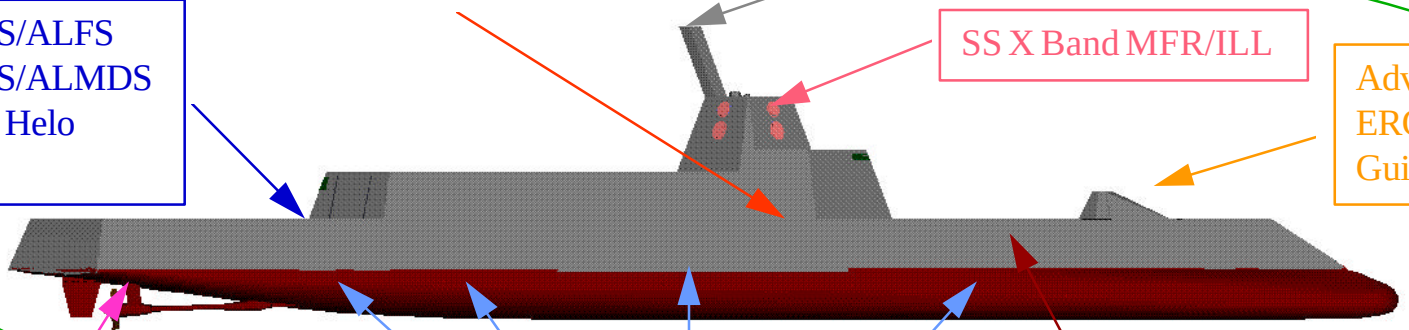
Topside

Inboard Profile

Full Cabability Combatant, 3B1, REV A



Common Features
for
Technical Feasibility Model



Computational Plant
Advanced Displays
Manning
Autonomics
Embedded Training

MFAA/ACES
RT Freq Mgt Sys
High Data Rate Comm
Multi-Sensor Integ
Advanced Tactical ID
AIEWS

Total Ship Signatures Management

LAMPS/ALFS
LAMPS/ALMDS
Armed Helo
UAV

SS X Band MFR/ILL

Advanced Gun
ERGM
Guided Projectile

LBVDS
SSTD

Modular Design
STD Monitoring & Control System
IPS
Advanced Fuel Efficient Gas Turbines

SM-2 BLK IVA
Theater TBMD MSL
High Kinematic MSL
Tomahawk BLK IV
TSTAR
ASUW MSL

SC-21 Indicative Design

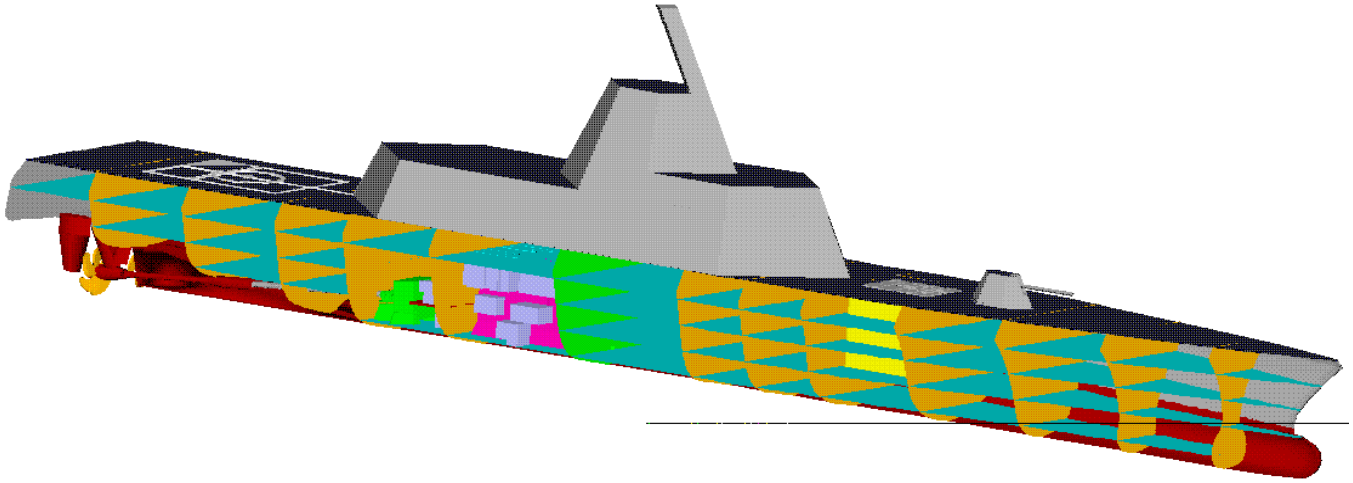
- **Full Capability Combatant is Superset**
- **Design Family of ships using top-down approach, once**
- ***CAPABILITY, AFFORDABILITY, FLEXIBILITY, UPGRADEABILITY, SCALABILITY***
  - ***ENABLED BY: MODULARITY, PRODUCIBILITY***
- **Indicative Design is**
  - **Notional only, Not THE SHIP!!!, will never build it!**
  - **Roadmap for Superset**
  - **Technical Feasibility Model**
  - **Means to build Milestone I Documentation**
  - **Basis for System Engineering Planning for Post Milestone I**
  - **Vehicle for early industry participation**

Superset Concept

- **Plan builds on COEA DA-02 Ship Concept for Full Capability Combatant, 3B1 as Superset for Requirements**
  - **Air Dominance Ship, 3D4, Concept adapted to reflect same ship concept to streamline analysis**
- **Incorporate both physical and functional Modularity for *UPGRADE-ABILITY* and *FLEX-IBILITY***
- ***SCALE-ABLE* Superset Requirements Support Tailored Mission Combatants as Subsets**
- **Guide Technology development in partnership with industry team**

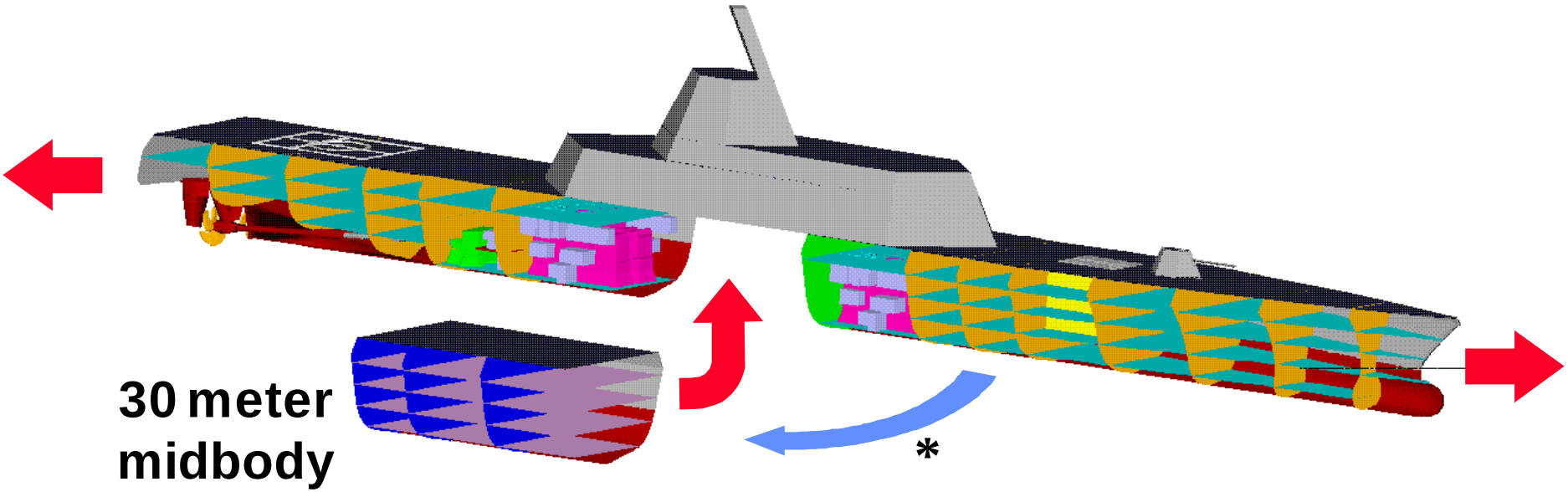
Superset Design Concept (1 of 3)

- **Ship subdivision and outfitting optimized for future upgrade e.g. Sea Dominance Ship to Full Capability Combatant**



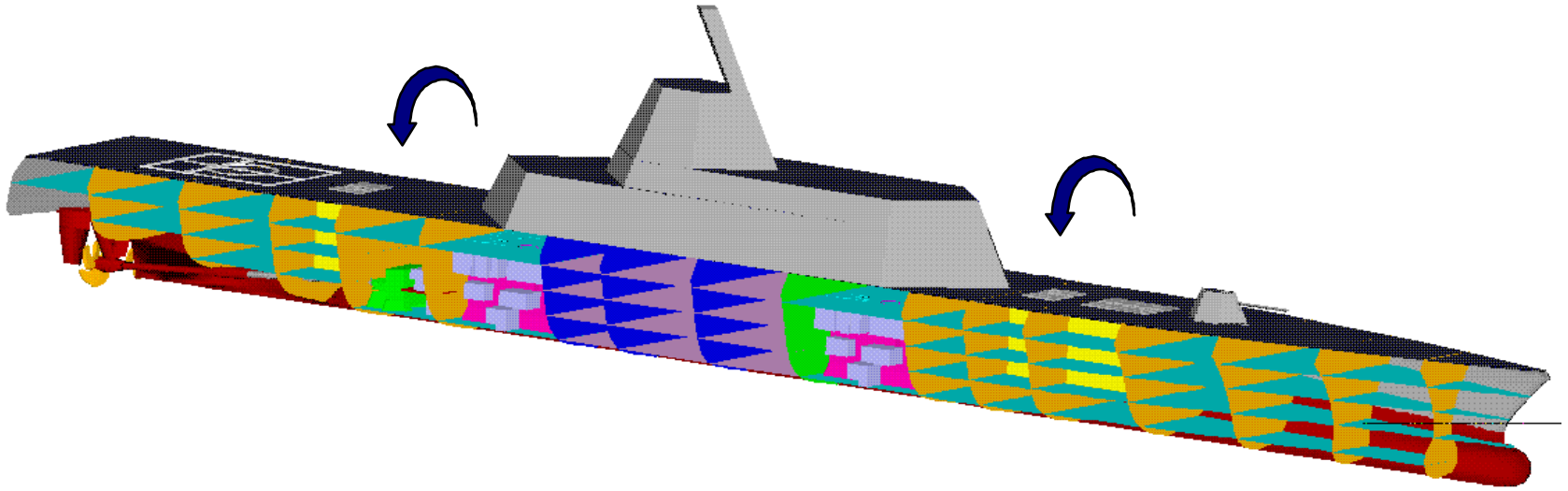
Superset Design Concept (2 of 3)

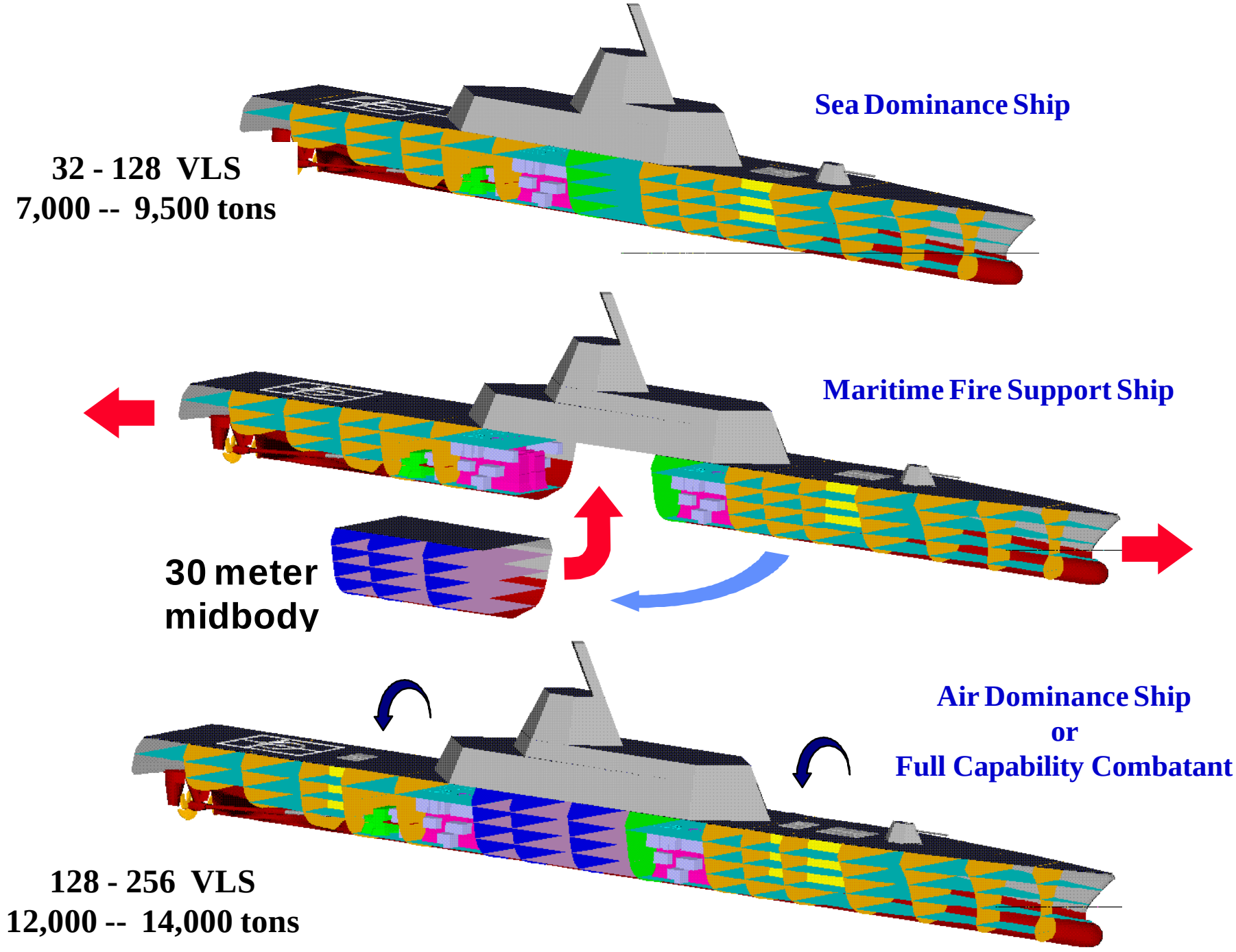
- **Pre-determined ship functions transfer into new parallel midbody***



Superset Design Concept (3 of 3)

- Vacated subdivisions receive weapons modules or other upgrades




Sea Dominance Ship
32 - 128 VLS
7,000 -- 9,500 tons
Maritime Fire Support Ship
30 meter
midbody
Air Dominance Ship
or
Full Capability Combatant
128 - 256 VLS
12,000 -- 14,000 tons

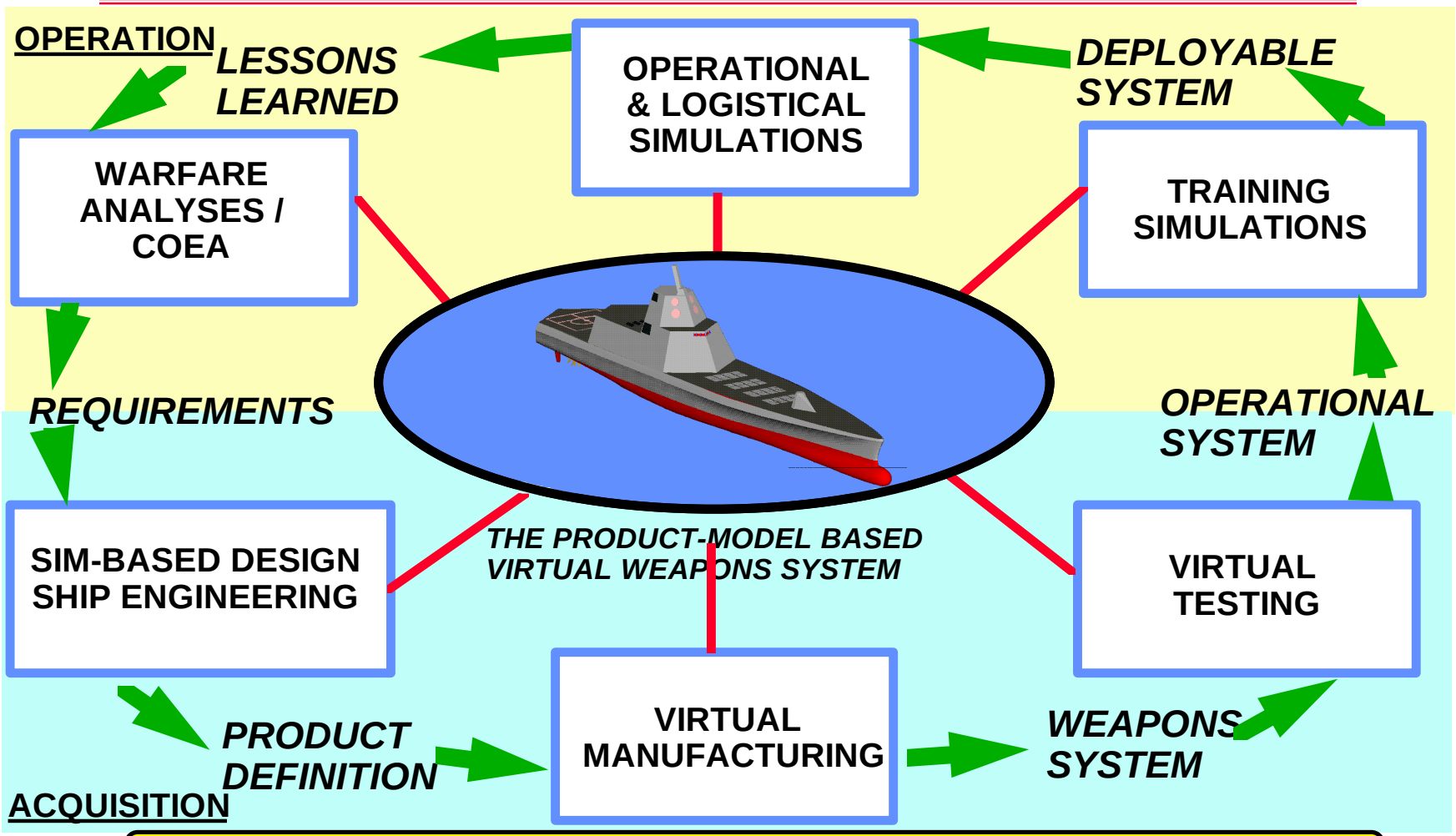
Next Steps

- Industry participate in SC-21 System Engineering IPTs
- Demo of CAD 2 / Product Model Enhancement (PME) -- in lobby
- Future Release (15 Oct) of Product Model Data
- SC-21 Industry/ Liaison Point of Contact
  - Mr. Adrian Eversoll
    - » phone: 703-602-6453 x121
    - » Fax: 703-602-6480
    - » E-Mail: Eversoll_Adrian @hq.navsea.navy.mil

Indicative Design as Enabler

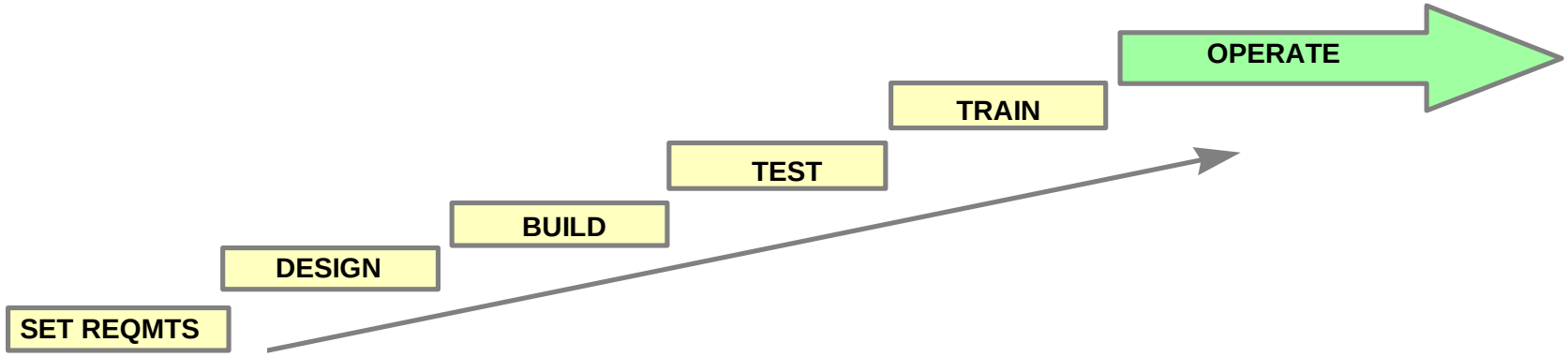
- System Engineering Technical Feasibility Model
- Engage national industrial base
  - System modules and construction blocks come from all major system vendors and all U.S. shipbuilders
- Reduced cycle time in response to emerging threats
- Focus R&D $$ toward new systems & *CAPABILITY*
- Provide Full Spectrum of *CAPABILITY*

SIMULATION-BASED DESIGN- THE VIRTUAL SHIP LIFE CYCLE

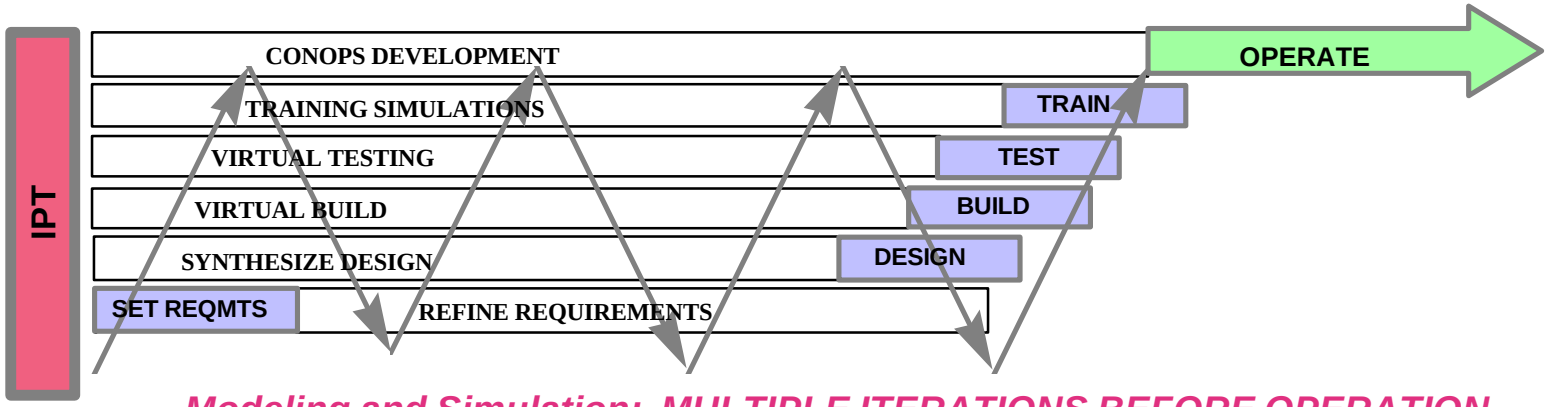


VISION: CONCEIVE, DESIGN, BUILD, TEST, TRAIN, AND OPERATE A WEAPONS SYSTEM IN A COMPUTER

Modeling and Simulation in the System Engineering Process



TRADITIONAL: 1 ITERATION



Modeling and Simulation: MULTIPLE ITERATIONS BEFORE OPERATION

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

NSIA MISSION

To bring Industry and Government together to resolve industrial problems effecting our ability to support the nation's military forces, and to maintain an effective defense industrial base in support of our forces of the future.

NSIA COMMITTEES AVAILABLE TO SC-21 PMO

- Strike, Surface and AAW
- C^4ISR
- Expeditionary Warfare
- Training and Simulation
- Software and Information Systems
- Undersea Warfare
- Logistics Management
- Quality and Reliability Assurance
- Environment
- Acquisition

SOME RELEVANT STUDIES

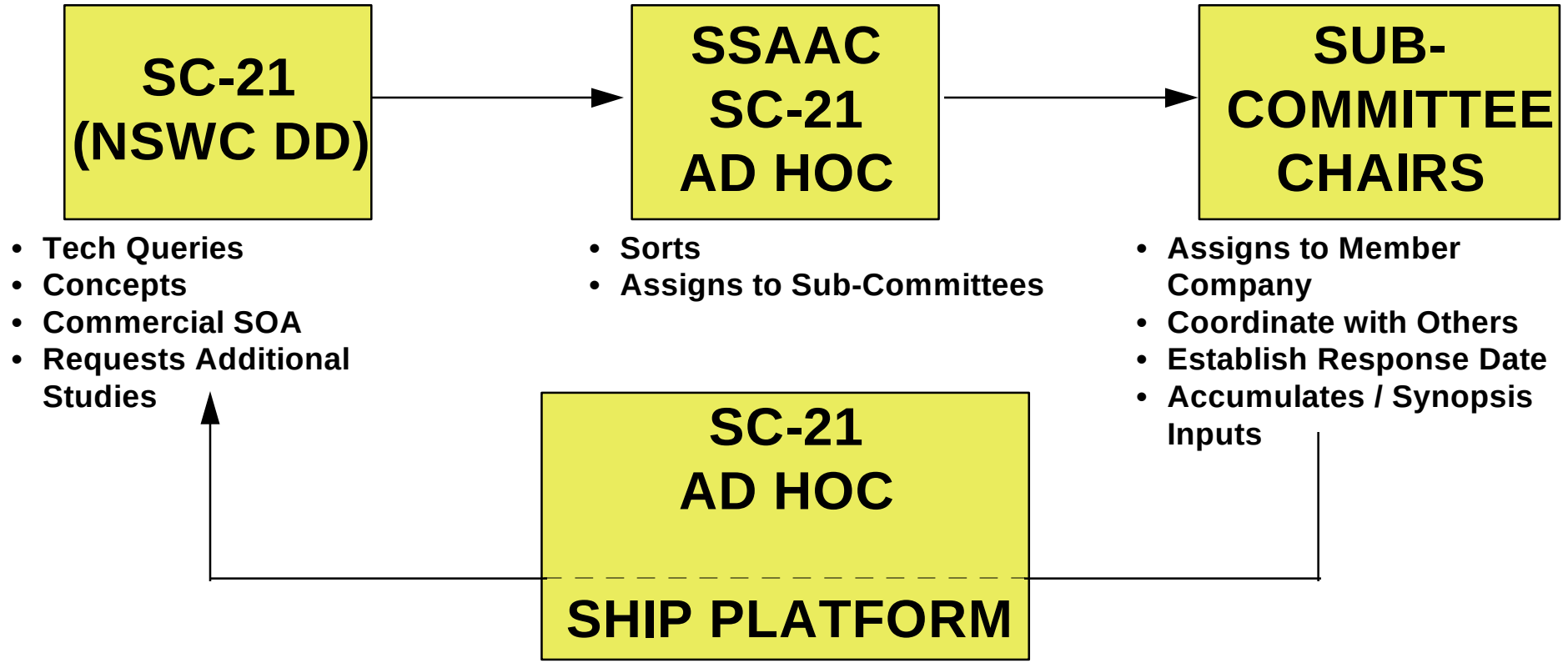
Surveys / Assessments / Impact

- Assessment of “Flexible Transition” concept on ship acquisition
- DDV - an approach to a $600M combatant
- Impact of Navy policy on excess ship disposal on industrial base
- Assessment of Copernicus implementation
- Impact of employing LHD’s in sea control
- Survey of ASM and ATBM capabilities

Technical

- Laser Based Weapons
- GPS/INS in missile guidance
- SC-21 strike weapons
- CEC a/b relay

CURRENT SC-21 NSIA PROCESS



SUBJECT RESPONSES TO DATE

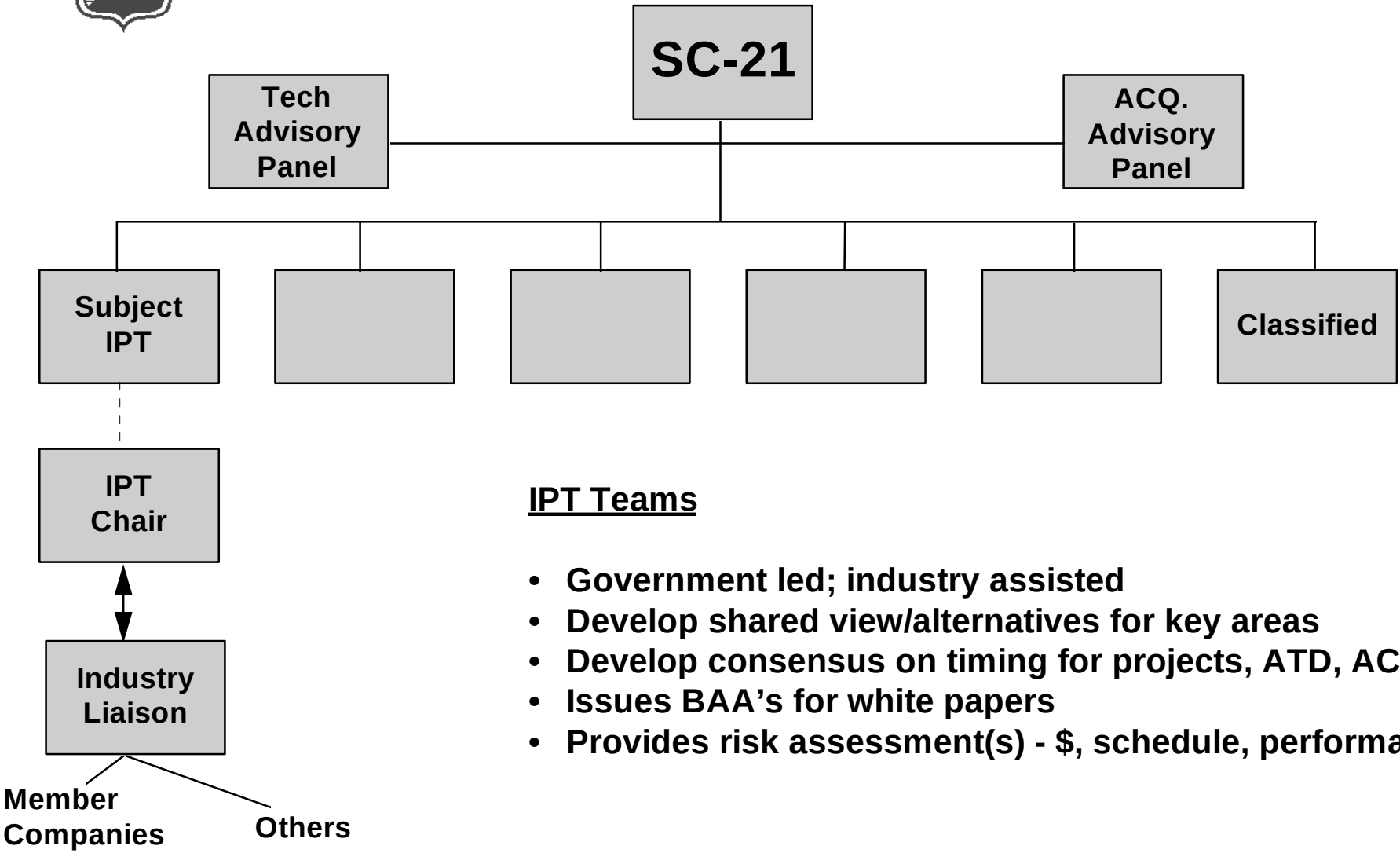
- **Availability of directed energy WEPS**
- **Availability and module costs for Ga As based arrays**
- **Innovations in Lube & Fuel oil systems**
- **AI applications in ship controls**
- **Manning reduction suggestions**
- **Industry computer models for survivability**

SUMMARY REQUEST FOR INFORMATION COMPANY LISTING

REQUEST FOR INFORMATION SEND TO:	RESPONSES
RAYTHEON COMPANY Dan Martin Tel: (508) 440 2978	Wide Range of Programs. See attached reply.
ITT GILFILLAN Dave Hammers Tel: (818) 902-2538	X & C Module Programs. See attached reply.
LOCKHEED-MARTIN (MORRISTOWN) Kim Harrington Tel: (609) 722-6116	Various IRAD programs Proprietary, Classified. See attached reply.
TECHNOLOGY SERVICE CORPORATION Chuck Shipley Tel: (310) 450-9755	Calibration system for active arrays. See attached reply.
TEXAS INSTRUMENTS David Zimmerman Tel: (214) 995-9939	Builds X-Band modules for GBR. See attached reply.
WESTINGHOUSE Jim Arnst Tel: (410) 765-2152	Have on going array programs Proprietary, Classified. No data sent.
TRW John Horton Tel: (310) 813-1156	Classified/Proprietary program. No data.
HUGHES AIRCRAFT Don Parker Tel: (31) 334-8534	Have on going array programs Proprietary, Classified. No data sent.

fr

IPT TEAM PROCESS



IPT Teams

- Government led; industry assisted
- Develop shared view/alternatives for key areas
- Develop consensus on timing for projects, ATD, ACTD
- Issues BAA's for white papers
- Provides risk assessment(s) - $, schedule, performance

SC-21 TEAM CHALLENGES

Mr. Jack Lennox - Raytheon

- **Will Navy provide Industry with sufficient information on the acquisition approach/timetable and and ongoing internal Navy technology development programs to stimulate investment in critical technologies?**
  - **Provide insight into Navy technology development goals, timing, and programs**
  - **Provide technology road maps with platforms insertion targets clearly focused**
- **Will the Fleet/Tycoms be prepared to make the doctrinal changes to support reduced manning and life cycle support changes necessary to underwrite fleet recapitalization costs?**
- **Can/Will Navy define the mission and concept of operation for each ship class within the Family of Ships?**
  - **Single or multi-mission**
  - **Deadweight tonnage and cost target**
  - **Common or scaled threat**

SC-21 TEAM CHALLENGES

Mr. Jack Lennox - Raytheon

- **Can the industry/Navy team design a (series of) lead ship(s) with advanced technology using procurement and product development methods new to both parties?**
- **Can we really design an advanced ship that is compatible with legacy systems - within cost and schedule that is also by the design capable of accepting new technology to avoid obsolescence?**
- **Will enhanced participation in Navy Technology Development, Modeling and Simulation and Requirements analysis focus Industry efforts, minimize duplication and improve the quality, cost, and performance of SC-21 system(s)? How do we measure ourselves?**
- **How will legacy system compatibility be determine? What process will be used to assure "forward-looking" Jointness?**

SOME THOUGHTS

Mr. Ken Malley - ARINC

- **How Generate (or Keep Track of) Next Generation, or Two, Technology in Design Process**
  - **Lead Org. with Strict Interface Controls?**
- **Leads to GFE/CFE Controls**
- **Open Communications Lines**
- **Human Factors Considered Early**

SOME THOUGHTS

Mr. Ken Malley - ARINC

- **COTS/NDI and "COMM" SPECS/STRDS Impacts Logistics/Training Needs**
- **Single Source Vice Multiple Source Compounds Above Unless "Strict" Coordination/Interface Control Implemented**
- **Judicious use of MIL SPEC Internal Deviations can Reduce Cost vice Starting From Scratch**

SC-21 ACQUISITION CHALLENGES

Mr. Harvey Gordon - Lockheed-Martin

- **Organizational Conflicts of Interest**
- **Dissipation of Independent Research & Development Resources**
- **Potential Third Party Tort Liability**
- **Past Performance as a Source Selection Factor**

ORGANIZATIONAL CONFLICT-OF-INTEREST

Mr. Harvey Gordon - Lockheed-Martin

- **An Inevitable Consequence of Horizontal Merger Activity and Business Combinations**
- **The Current Policy Guidelines Are Out-of-Date and Not Compatible With Present DoD Policy:**
  - **Reduce Overcapacity**
  - **Technological Synergism Through Teaming**
  - **Maximize Use of Commercial Technology and "NDI"**
- **Is There Still Anybody Out There?**
- **The Integrity of the Competitve Process Requires Equal Opportunity and Not the Sustenance or Assurance of Equal Ability**
- **A Level Playing Field Is Required for Effective Competition but Emphasis on Past Performance and Technical Excellence Should and Must Favor the Offeror With Superior Knowledge, Capability , and Experience**
- **Update FAR Guidance: Criteria and Factors to Be Considered Relative to, Waiver, Recusal, and Mitigation**

DISSIPATION OF INDEPENDENT RESEARCH & DEVELOPMENT RESOURCES

Mr. Harvey Gordon - Lockheed-Martin

- **IR&D Intended to Ensure Global Technological Leadership by Promoting Exploratory and Advanced R&D Not Funded Under Contract by the Government (6.1 Through 6.3)**
- **Use of Other Instrumentalities in Lieu of R&D Contracts to Encourage Contributions in-Kind by Industry Through Commitment Of IR&D Resources Will Lead to Emphasis on Near-Term Product Development in Lieu of Advanced Technology**
- **Will We Be Eating Our "Seed Corn"?**
- **Concern: FY97 Authorization for DoD Gives Authority, Previously Vested Solely With DARPA to Use Instrumentalities Other Than Contracts to Fund Development?**
  - **Will Budget Constraints Tempt Procuring Activities to Tap IR&D Resources As a Means of Getting Contractors to Share the Cost of Development?**
  - **Will Use of Other Instrumentalities Abridge Use of Full and Open Competition?**
  - **Are We Driving Out the "Mom & Pop" Contractors?**

POTENTIAL THIRD-PARTY TORT LIABILITY

Mr. Harvey Gordon - Lockheed-Martin

- **So-Called Government Contractor Defense (Boyle Case) Essentially Indemnifies Government Contractors Against Third Party Tort Liability**
- **Enhanced Reliance on Contractor Specifications and Standards Under Performance-Based contracting Erodes the Essential Prerequisites That Must Be Met to Meet the Government Contractor Defense Test**
- **How Will and Should The government Mitigate This risk:**
  - **Indemnification**
  - **Endorsement or Concurrence in Contractor Specifications and Standards**
  - **Approval of the Contractor's Design**
  - **Preemptive Federal Statute**
- **Concern: No One Is Thinking About This Problem**
  - **Will Cause an Increase in Prices Paid by the Government Because of Increased Contractor Risk and Insurance**
  - **Will Discourage Use of Advanced Technology Which Is High Risk**
  - **May Impair the Performance Capability of Delivered Systems**

PAST PERFORMANCE AS A SOURCE SELECTION FACTOR

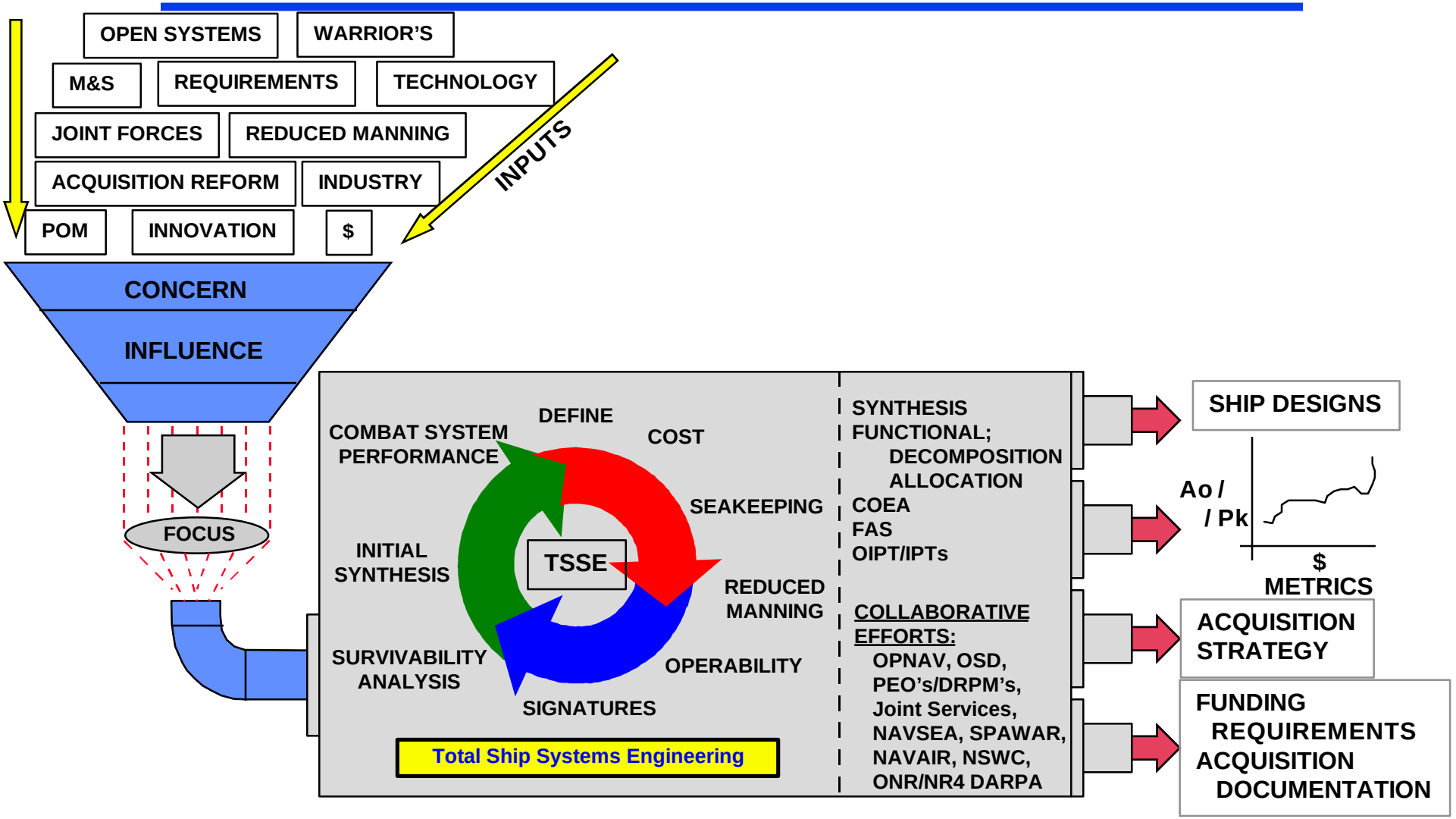
Mr. Harvey Gordon - Lockheed-Martin

- **Current Policy Requires Past Performance Be a Heavily Weighted Factor in All Source Selections**
- **Current, Accurate, and Documented Database Required for Reliance on Past Performance As a Discriminator . . . . No Such Data Collection System and Data Repository Currently Exists**
- **Are We Evaluating the Right Thing . . . . . Performance of the Contract or Performance of The Contract End Item - That Which Is Really the Purpose of the Contract?**
- **Need for Better Guidance to Collect Data and to Use Data**
- **In Today'S World, Is There Really Any Such Thing As Relevant Past Performance**
  - **– Turmoil in the Industry Because of Mergers, Consolidations, and Downsizing**
  - **– Rapid Change in Technology As to What Is Produced and How It Is Produced**
  - **– Definition of Relevance Is Fact Specific**
- **Is Past Performance Really a Risk Factor and Not a Responsibility Factor?**

AGENDA

0800	Welcome	Mr. E. J. Hinman, JHU/APL
0805	Introduction	RADM Huchting CAPT Townes
0820	Current Program Status	CAPT Mahoney
0845	COEA Status	Dr. Lewellyn, CNA
0915	System Threat Assessment Report (STAR)	Mr. Patrick Clark, ONI
0935	Break	
0945	SC-21 Systems Engineering and Technology Overview	Mr. Mike Yermakov
1015	Ship Signature Requirements	LCDR Roger McGinnis
1035	Design Concepts	CDR Joe Berner
1105	Industry Panel	Mr. Joe Conway, NSIA
1200	Wrap-Up	CAPT Mahoney

SC-21 Phase 0 Efforts



Swath Hull Form

Trimaran Hull Form

K2 Hull Form

TumbleHome Hull Form

Other Hull Forms

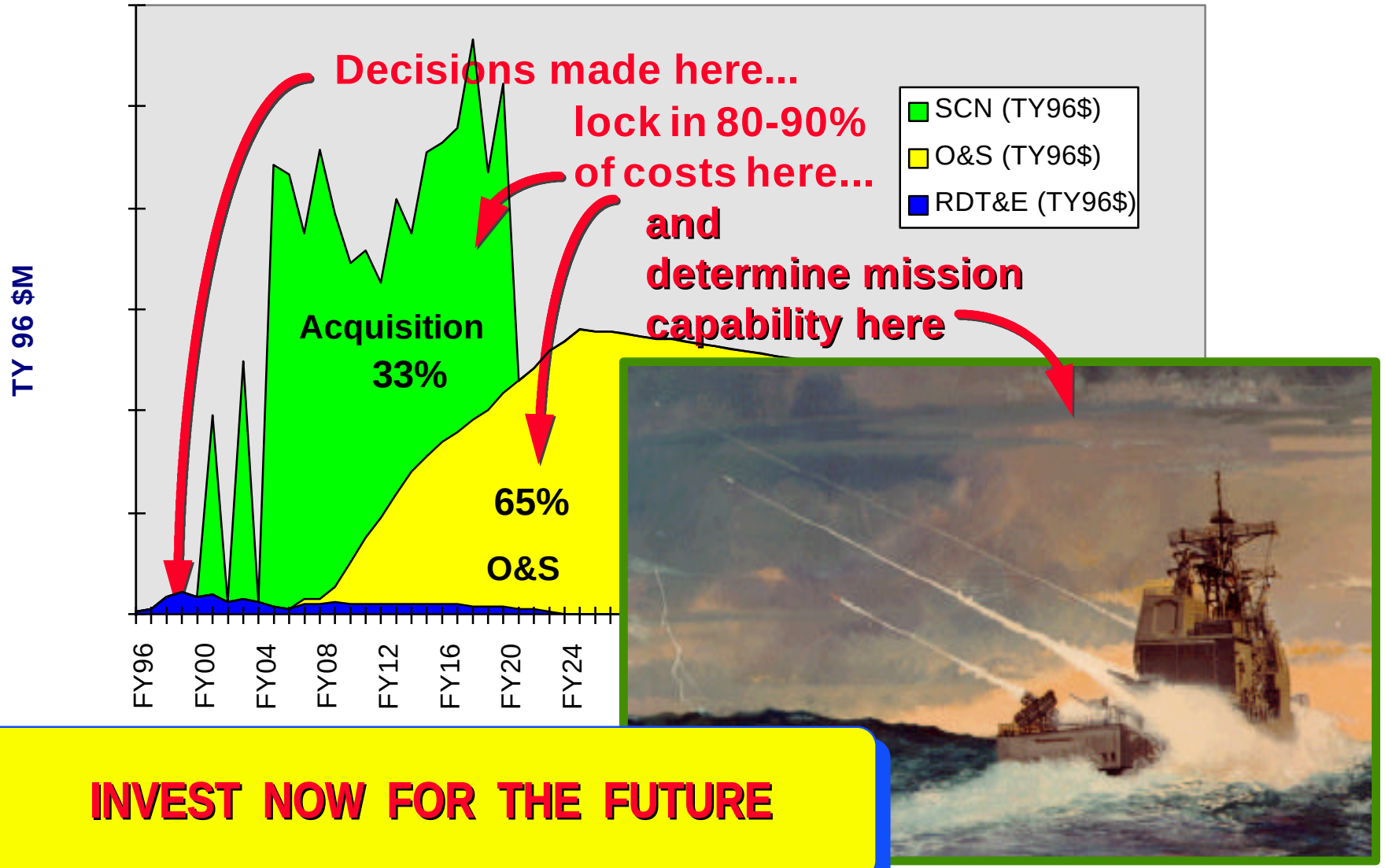
SC 21 SHIP HULL CONCEPTS

Re-engineering the Navy

- **Requirements - MNS/COEA driven**
- **Ship family options**
- **Total Ship Systems Engineering**
  - **Multiple Independent Program coordination (DDG >> 80)**
- **Technology Transition - Innovation vs. Risk**
- **Acquisition Strategy - under development**
  - **Industry Involvement**
- **RESOURCES required - People & $$'s**
  - **Across program + M&S**
  - **POM-98 effort**

SC-21 Will Be Our Legacy to the 21st Century Navy

RE-ENGINEERING THE NAVY



INVEST NOW FOR THE FUTURE